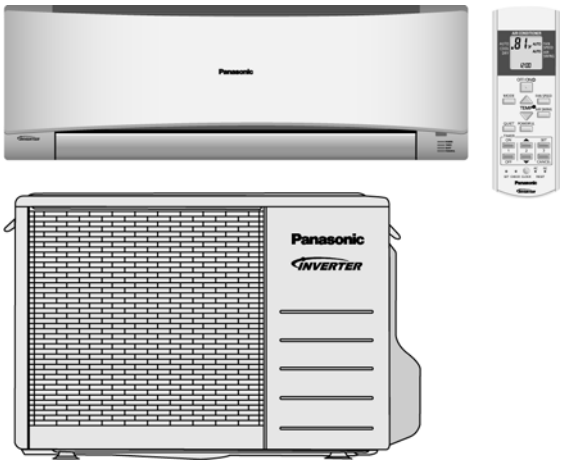
Order No: PHAAM1111085C1

Service Manual

Air Conditioner



Indoor Unit	Outdoor Unit
CS-S9NKUA	CU-S9NKUA
CS-S12NKUA	CU-S12NKUA

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the products dealt with in this service information by anyone else could result in serious injury or death.

⚠ PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

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1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

⚠ **WARNING**	This indication shows the possibility of causing death or serious injury.
⚠ **CAUTION**	This indication shows the possibility of causing injury or damage to properties.

- The items to be followed are classified by the symbols:

⃠	This symbol denotes item that is PROHIBITED from doing.

- Carry out test run to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

	⚠ **WARNING**	
1.	Do not modify the machine, part, material during repairing service.	
2.	If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.	
3.	Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4.	Engage authorized dealer or specialist for installation and servicing. If installation of servicing done by the user is defective, it will cause water leakage, electrical shock or fire.	
5.	Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.	
6.	Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
7.	Install at a strong and firm location which is able to withstand the set’s weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
8.	For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
9.	This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.	
10.	Do not use joint cable for indoor/outdoor connection cable. Use the specified indoor/outdoor connection cable, refer to installation instruction CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor/outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connecting or fixing is not perfect, it will cause heat up or fire at the connection.	
11.	Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at the connection point of terminal, fire or electrical shock.	
12.	When install or relocate air conditioner, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigeration cycle (piping). (Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).	
13.	Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.	
14.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case equipment breakdown or insulation breakdown.	⃠
15.	Keep away from small children, the thin film may cling to nose and mouth and prevent breathing.	⃠
16.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	⃠
17.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.	
18.	For R410A models, when connecting the piping, do not use any existing (R22) pipes and flares nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. In case of using existing (R22) pipes during installation of R410A models, must carry out pump down properly to collect back the refrigerant and oil before installation new unit. Thickness of copper pipes used with R410A must be more than 0.6mm. Never use copper pipes thinner than 0.6mm. It is desirable that the amount of residual oil is less than 40 mg/10m.	⃠

	⚠ WARNING
19.	During installation, install the refrigerant piping properly before run the compressor. (Operation of compressor without fixing refrigeration piping and valves at opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).
20.	During pump down operation, stop the compressor before remove the refrigeration piping. (Removal of refrigeration piping while compressor is operating and valves are opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.)..
21.	After completion of installation or service, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
22.	Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when the refrigerant contacts with fire.
23.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury
24.	Must not use other parts except original parts describe in catalog and manual.
25.	Using of refrigerant other than the specified type may cause product damage, burst and injury etc.

	⚠ CAUTION
1.	Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.
2.	Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
3.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
4.	Do not touch outdoor unit air inlet and aluminium fin. It may cause injury.
5.	Select an installation location which is easy for maintenance.
6.	Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F – 70°F (30°C – 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).
7.	Power supply connection to the air conditioner. Connect the power supply cord of the air conditioner to the mains using one of the following methods. Power supply point shall be the place where there is ease for access for the power disconnection in case of emergency. In some countries, permanent connection of this room air conditioner to the power supply is prohibited. i. Power supply connection to the receptacle using a power plug. Use an approved 15/16A (1.0 ~ 1.75HP) or 16A (2.0HP) or 20A (2.5HP), power plug with earth pin for the connection to the socket. ii. Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A (1.0 ~ 2.0HP) or 20A (2.5HP), circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
8.	Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite.
9.	Installation or servicing work: It may need two people to carry out the installation or servicing work.
10.	Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.
11.	Do not sit or step on the unit, you may fall down accidentally.
12.	Do not touch the sharp aluminum fins , sharp parts may cause injury.

2. Specification

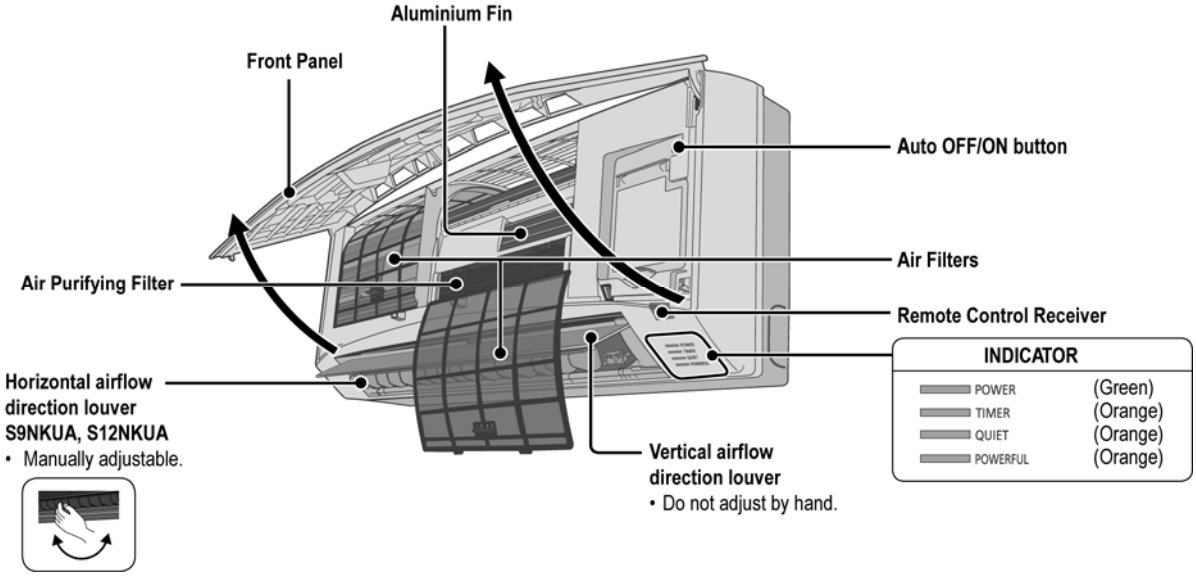
Model			Indoor	CS-S9NKUA						CS-S12NKUA					
			Outdoor	CU-S9NKUA						CU-S12NKUA					
Performance Test Condition				ARI						ARI					
Power Supply			Phase, Hz	Single, 60						Single, 60					
			V	208			230			208			230		
				Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.
Cooling	Capacity		kW	1.20	2.49	3.00	1.20	2.49	3.00	1.20	3.51	3.90	1.20	3.51	3.90
			BTU/h	4100	8500	10200	4100	8500	10200	4100	12000	13300	4100	12000	13300
	Running Current		A	-	3.5	-	-	3.1	-	-	5.2	-	-	4.7	-
	Input Power		W	250	650	850	250	650	850	250	1.00k	1.15k	250	1.00k	1.15k
	EER		W/W	4.80	3.83	3.53	4.80	3.83	3.53	4.80	3.51	3.39	4.80	3.51	3.39
			Btu/hW	16.40	13.05	12.00	16.40	13.05	12.00	16.40	12.00	11.55	16.40	12.00	11.55
	Power Factor		%	-	89	-	-	91	-	-	92	-	-	93	-
	Indoor Noise (H / L / QLo)		dB-A	40 / 25 / 20			40 / 25 / 20			43 / 28 / 20			43 / 28 / 20		
			Power Level dB	56 / -			56 / -			59 / -			59 / -		
	Outdoor Noise (H / L / QLo)		dB-A	47 / - / -			47 / - / -			48 / - / -			48 / - / -		
			Power Level dB	62 / -			62 / -			63 / -			63 / -		
Max Current (A) / Max Input Power (W)				4.4 / 940						6.8 / 1.53k					
Starting Current (A)				3.5						5.2					
Min Circuit Ampacity				15.0						15.0					
Max. Overcurrent Protection				15.0						15.0					
Compressor	Type			Hermetic Motor						Hermetic Motor					
	Motor Type			Brushless (4 poles)						Brushless (4 poles)					
	Output Power		W	700						700					
Indoor Fan	Type			Cross-flow fan						Cross-flow fan					
	Material			ASG20K1						ASG20K1					
	Motor Type			Transistor (8 poles)						Transistor (8 poles)					
	Input Power		W	47.0 - 47.0						47.0 - 47.0					
	Output Power		W	40						40					
	Speed	QLo	rpm	620						630					
		Lo	rpm	720						790					
		Me	rpm	930						1030					
		Hi	rpm	1150						1270					
		SHi	rpm	1250						1400					
Outdoor Fan	Type			Propeller						Propeller					
	Material			PP						PP					
	Motor Type			DC (8 poles)						DC (8 poles)					
	Input Power		W	-						-					
	Output Power		W	40						40					
	Speed	Hi	rpm	830 - 830						830 - 830					
Moisture Removal			L/h (Pt/h)	0.6 (1.3)						1.2 (2.5)					
Indoor Airflow	QLo		m^3/min (ft^3/min)	5.42 (191)						5.30 (187)					
	Lo		m^3/min (ft^3/min)	6.51 (230)						6.98 (246)					
	Me		m^3/min (ft^3/min)	8.80 (311)						9.49 (335)					
	Hi		m^3/min (ft^3/min)	11.2 (395)						12.0 (425)					
	SHi		m^3/min (ft^3/min)	12.29 (434)						13.36 (472)					
Outdoor Airflow	Hi		m^3/min (ft^3/min)	31.0 (1095)			31.0 (1095)			31.0 (1095)			31.0 (1095)		

Refrigeration Cycle	Control Device		Capillary Tube		Capillary Tube	
	Refrigerant Oil	cm^3	FV50S (320)		FV50S (320)	
	Refrigerant Type	g (oz)	R410A, 980 (34.6)		R410A, 980 (34.6)	
Dimension	Height(I/D / O/D)	mm (inch)	290 (11-7/16) / 540 (21-9/32)		290 (11-7/16) / 540 (21-9/32)	
	Width (I/D / O/D)	mm (inch)	870 (34-9/32) / 780 (30-23/32)		870 (34-9/32) / 780 (30-23/32)	
	Depth (I/D / O/D)	mm (inch)	204 (8-1/16) / 289 (11-13/32)		204 (8-1/16) / 289 (11-13/32)	
Weight	Net (I/D / O/D)	kg (lb)	9 (20)	37 (82)	9 (20)	37 (82)
Piping	Pipe Diameter (Liquid / Gas)	mm (inch)	6.35 (1/4) / 9.52 (3/8)		6.35 (1/4) / 12.70 (1/2)	
	Standard length	m (ft)	7.5 (24.6)		7.5 (24.6)	
	Length range (min – max)	m (ft)	3 (9.8) ~ 20 (65.6)		3 (9.8) ~ 20 (65.6)	
	I/D & O/D Height different	m (ft)	15 (49.2)		15 (49.2)	
	Additional Gas Amount	g/m (oz/ft)	20 (0.2)		20 (0.2)	
	Length for Additional Gas	m (ft)	7.5 (24.6)		7.5 (24.6)	
Drain Hose	Inner Diameter	mm (inch)	16.7 (5/8)		16.7 (5/8)	
	Length	mm (inch)	650 (25-5/8)		650 (25-5/8)	
Indoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)		Aluminium (Pre Coat)	
	Fin Type		Slit Fin		Slit Fin	
	Row x Stage x FPI		2 x 15 x 19		2 x 15 x 21	
	Size (W x H x L)	inch	(1) x (12-3/8) x (24)		(1) x (12-3/8) x (24)	
Outdoor Heat Exchanger	Fin Material		Aluminium (Blue coated)		Aluminium (Blue coated)	
	Fin Type		Corrugate Fin		Corrugate Fin	
	Row x Stage x FPI		2 x 24 x 17		2 x 24 x 17	
	Size (W x H x L)	inch	(1-3/8) x (19-7/8) x (28-1/8) (26-7/8)		(1-3/8) x (19-7/8) x (28-1/8) (26-7/8)	
Air Filter	Material		Polypropelene		Polypropelene	
	Type		One-touch		One-touch	
Power Supply			Outdoor		Outdoor	
Power Supply Cord		A	-		-	
Thermostat			-		-	
Protection Device			-		-	
			DRY BULB	WET BULB	DRY BULB	WET BULB
Indoor Operation Range		Maximum	89.6	73.4	89.6	73.4
		Minimum	60.8	51.8	60.8	51.8
Outdoor Operation Range		Maximum	109.4	78.8	109.4	78.8
		Minimum	14.0	-	14.0	-

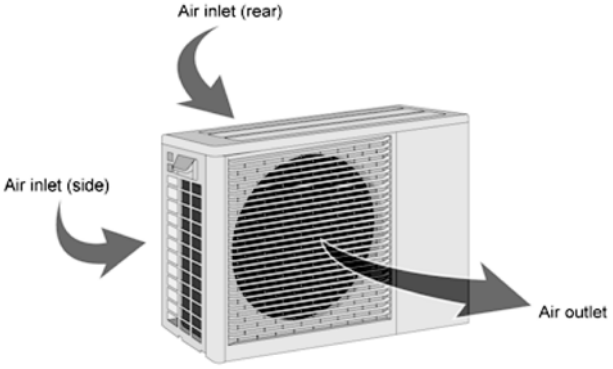
1. Cooling capacities are based on indoor temperature of 80.6°F DRY BULB, 66°F WET BULB and outdoor air temperature of 95°F DRY BULB, 75.2°F WET BULB.

3. Location of Controls and Components

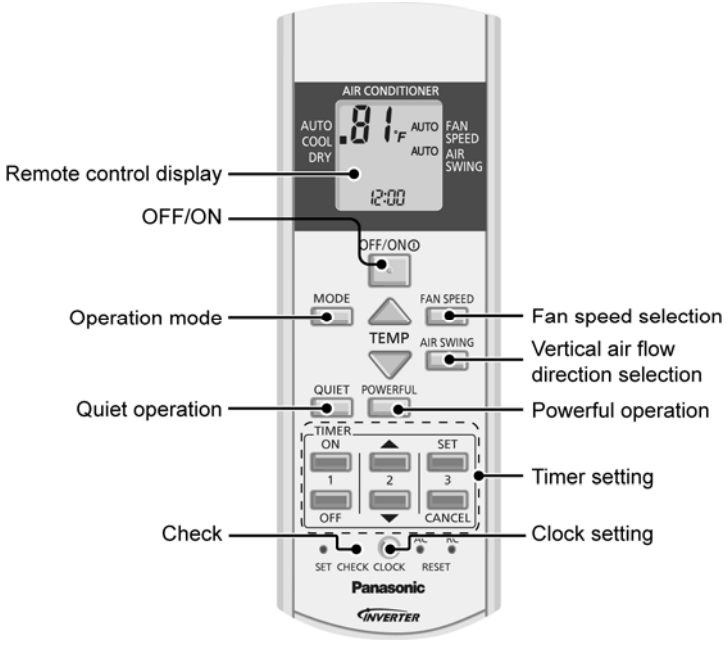
3.1 Indoor Unit



3.2 Outdoor Unit

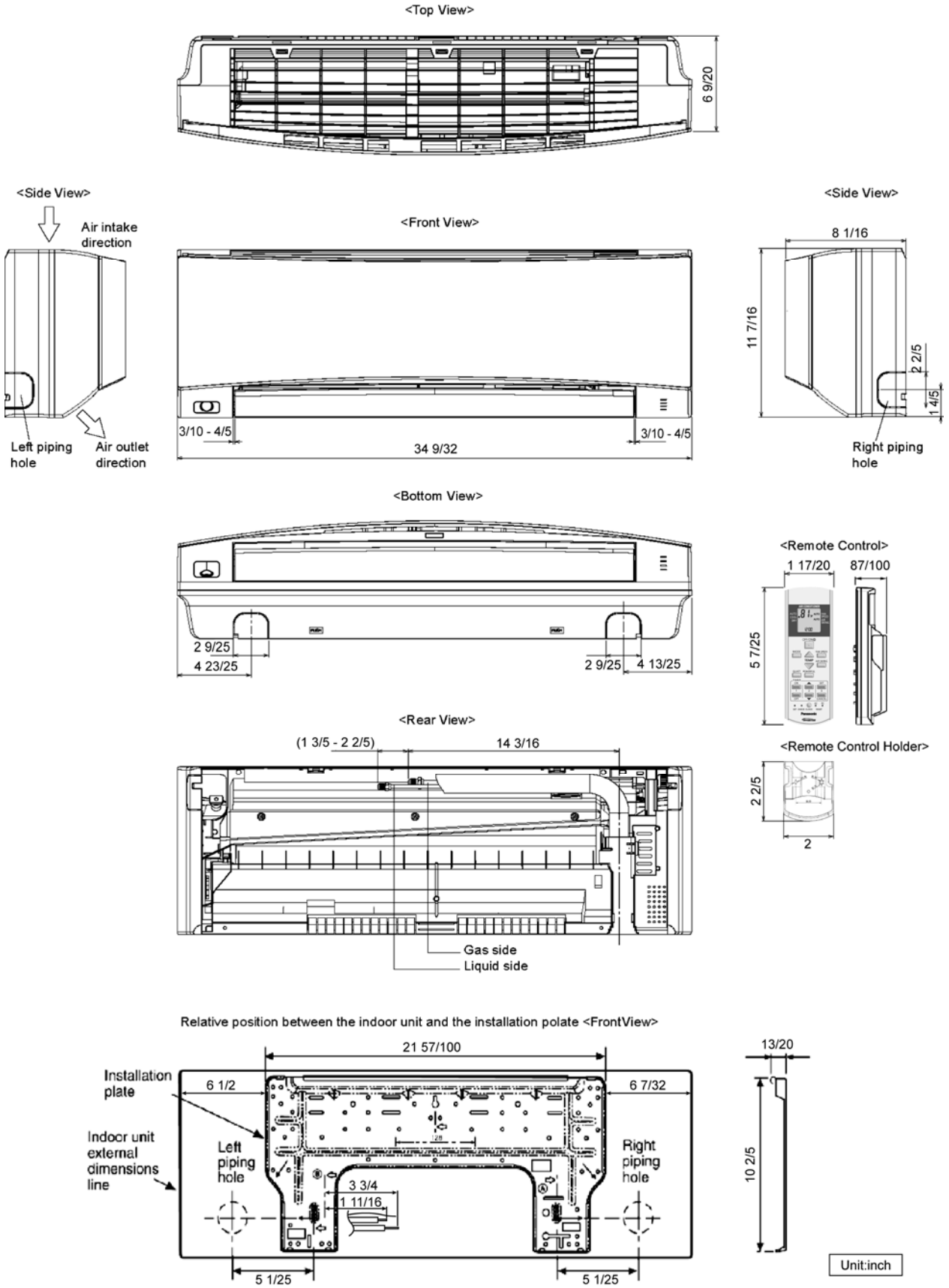


3.3 Remote Control

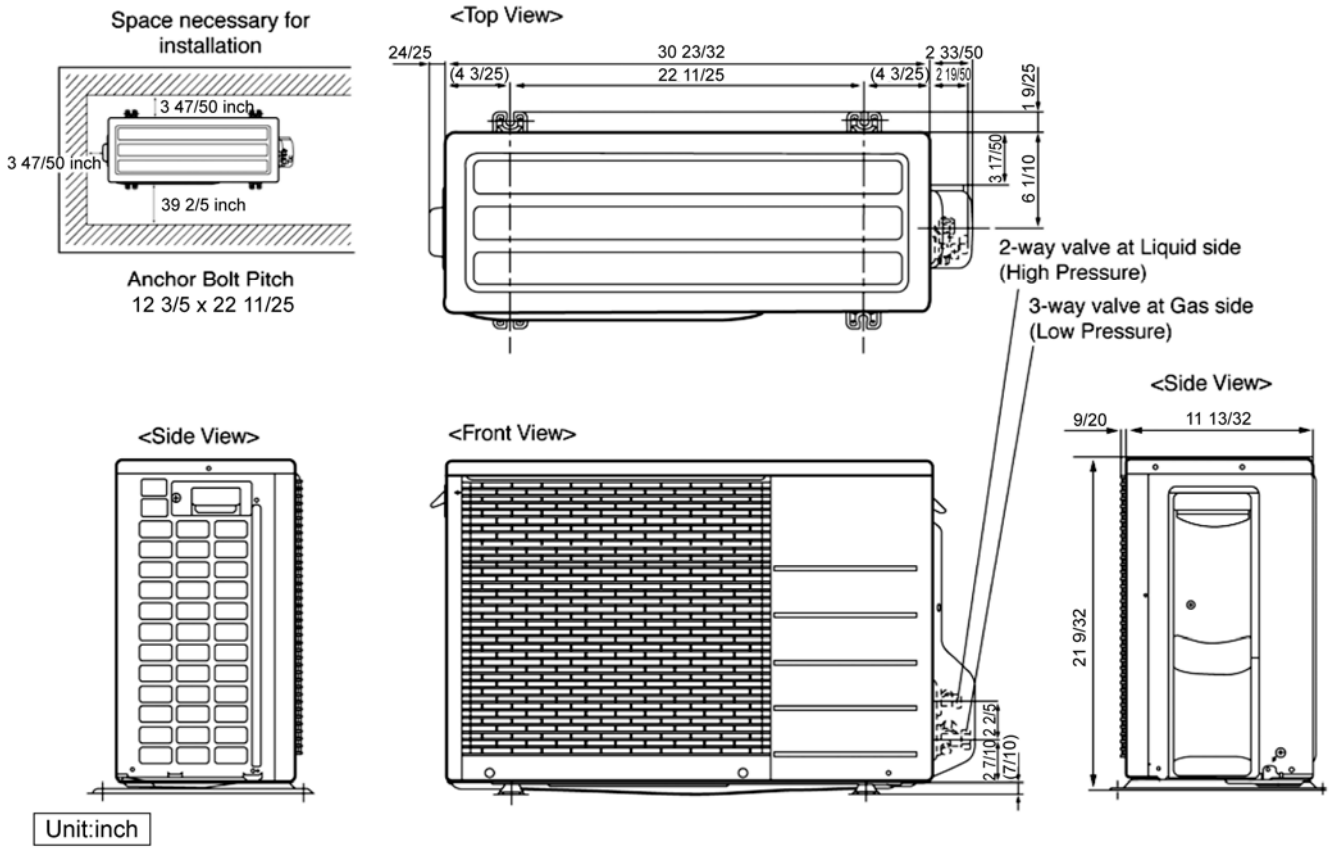


4. Dimensions

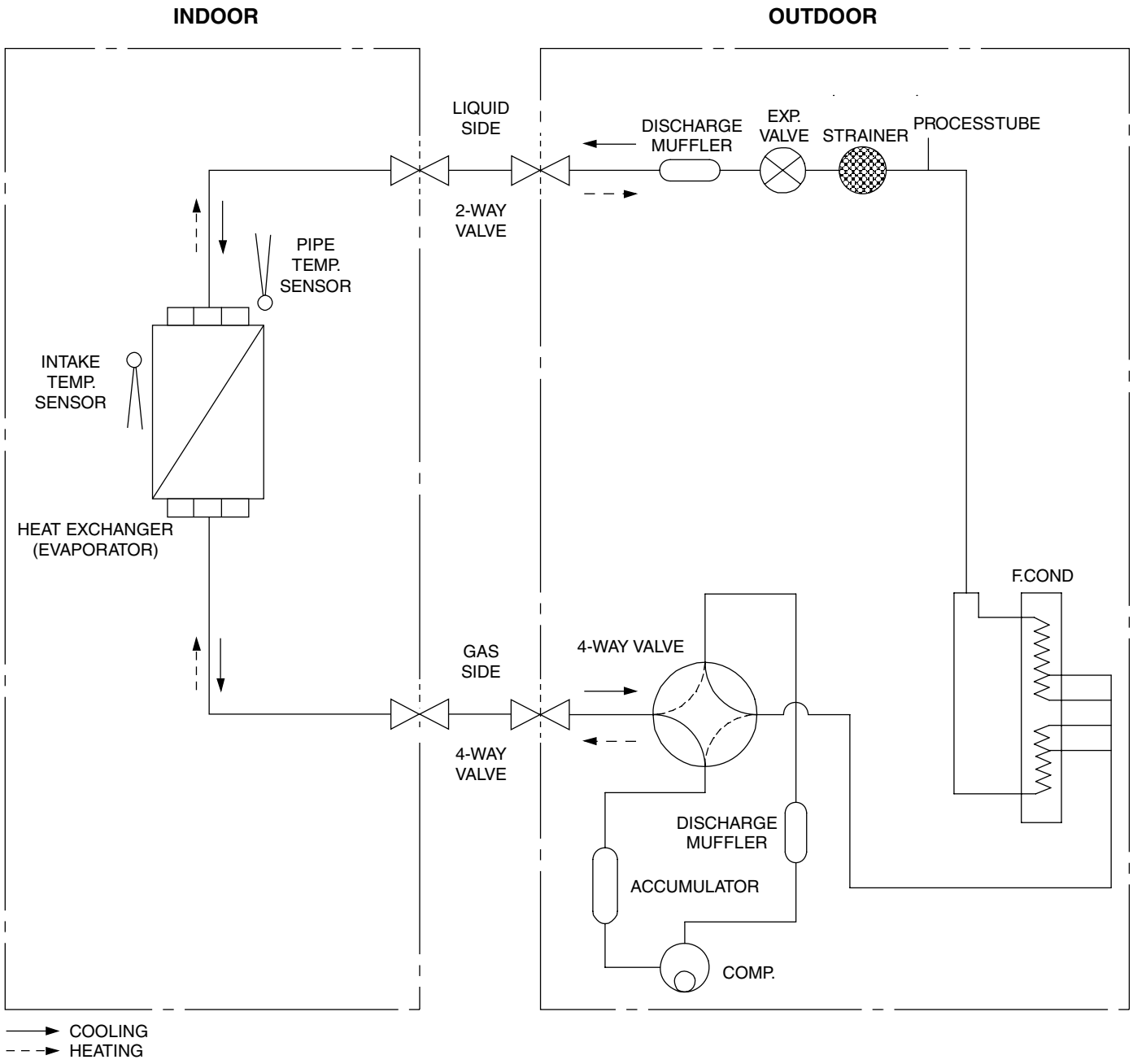
4.1 Indoor Unit



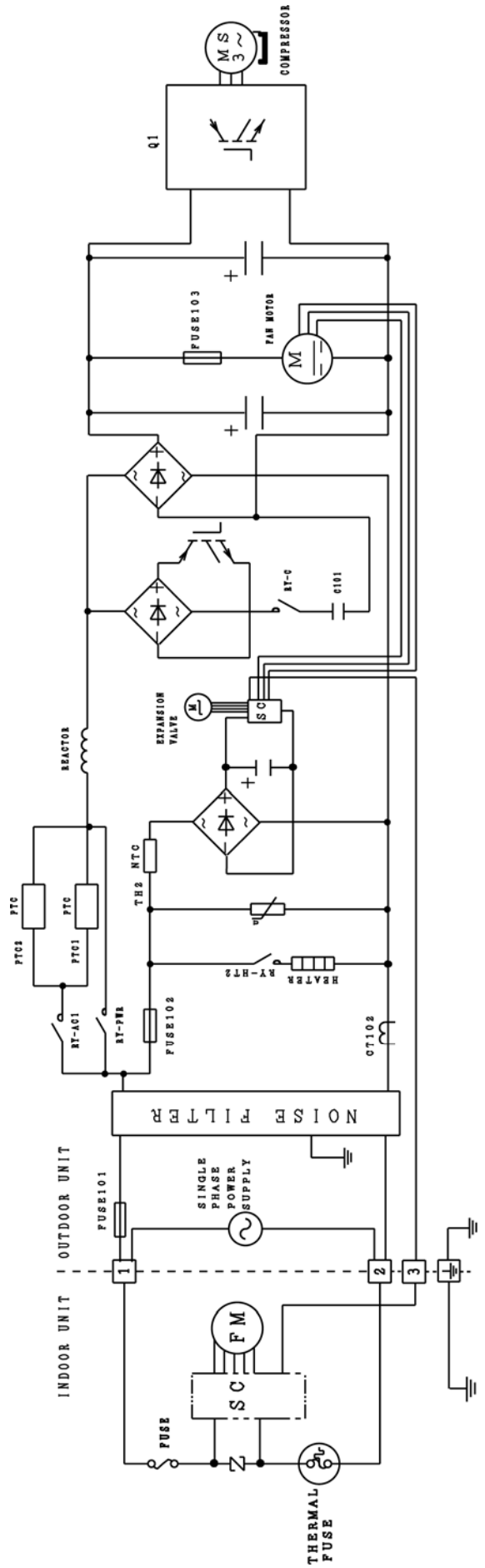
4.2 Outdoor Unit



5. Refrigeration Cycle Diagram

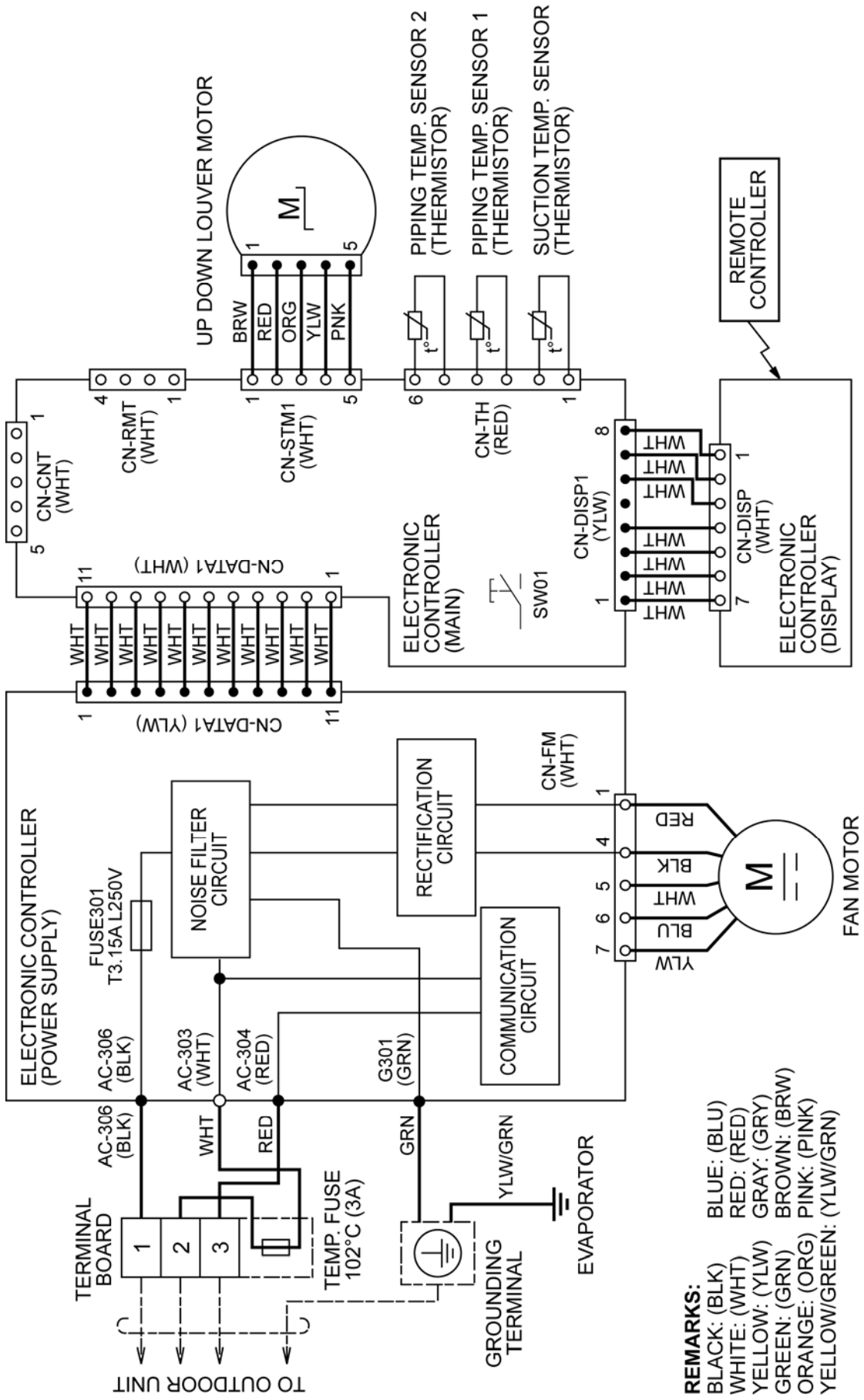


6. Block Diagram

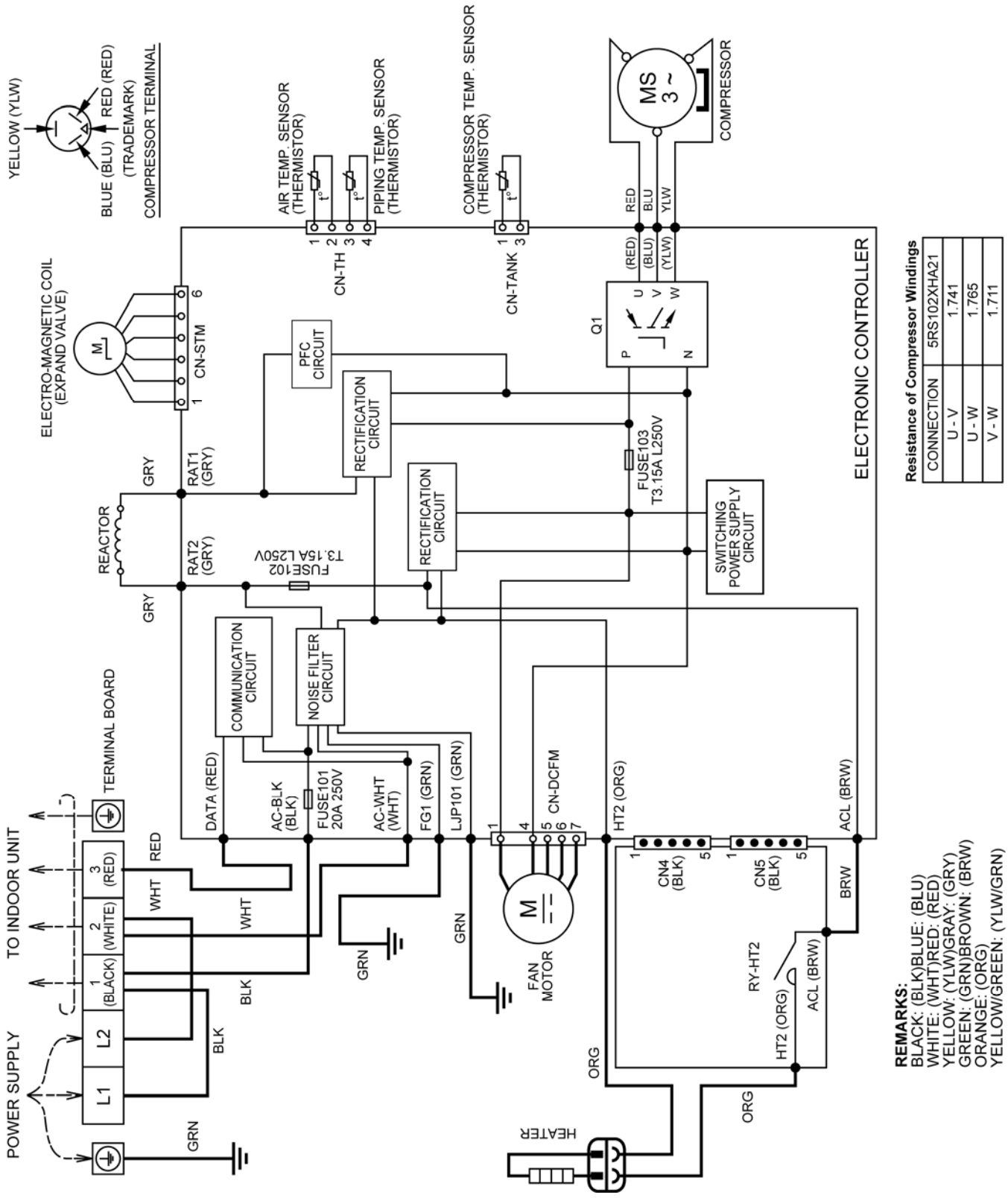


7. Wiring Connection Diagram

7.1 Indoor Unit

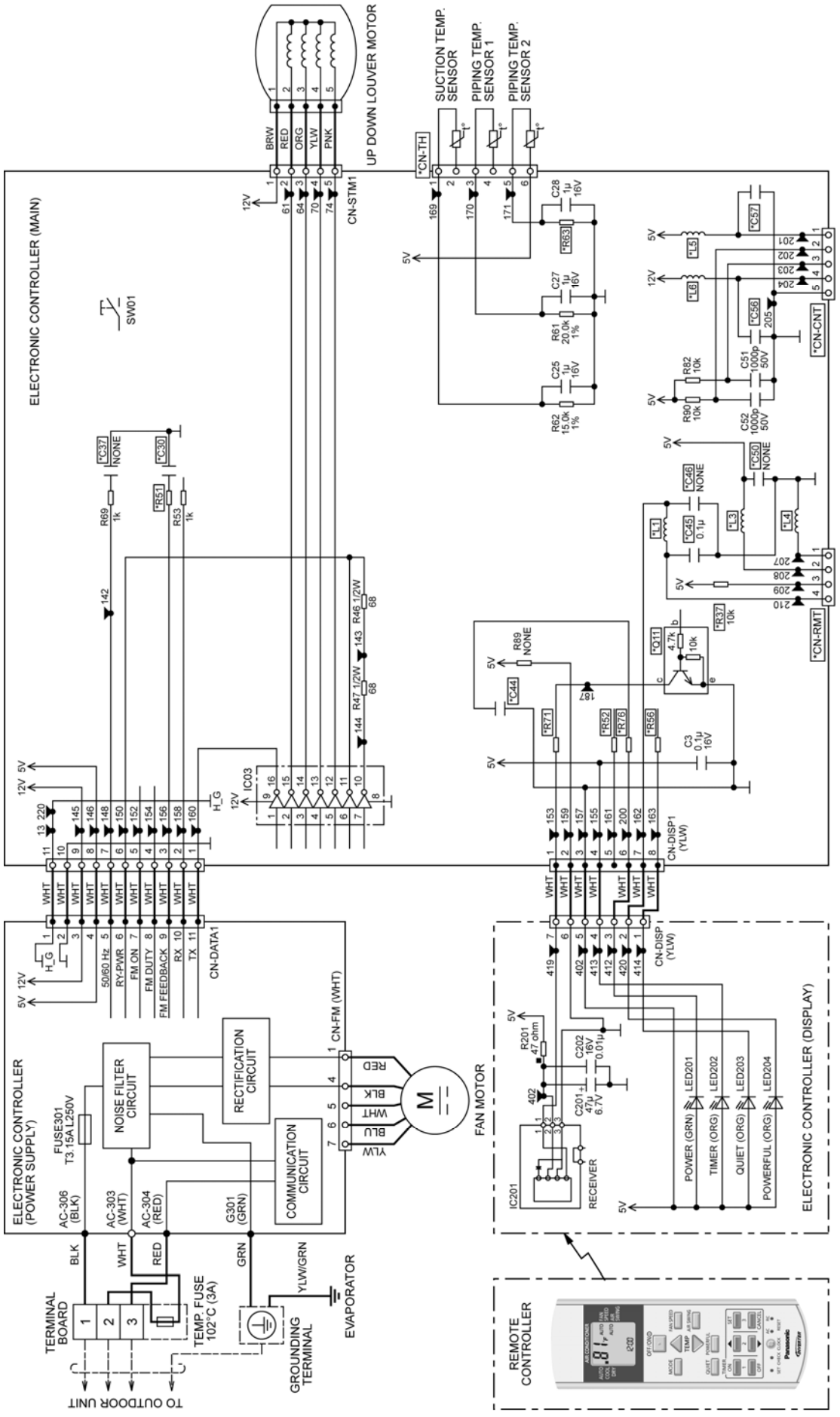


7.2 Outdoor Unit

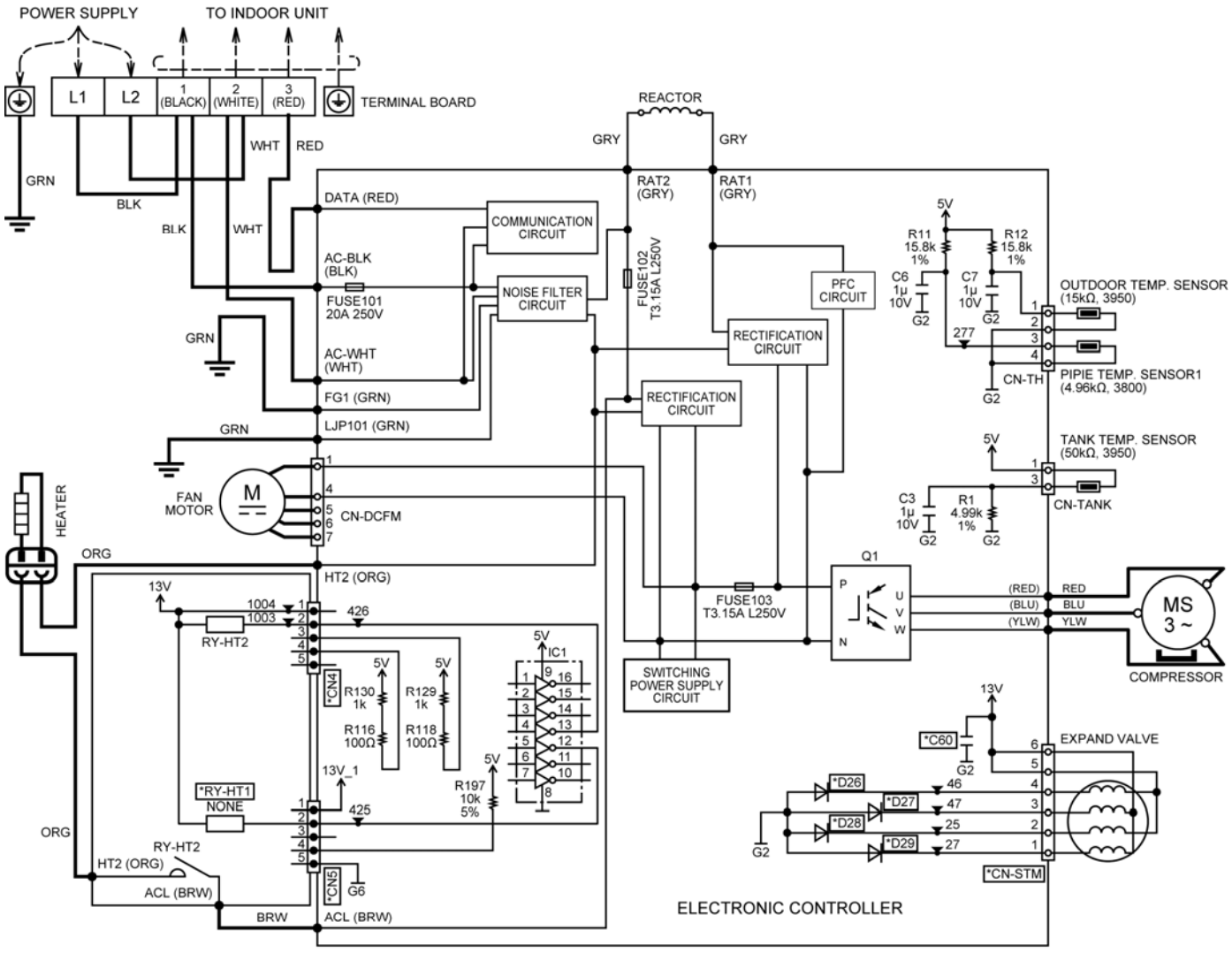


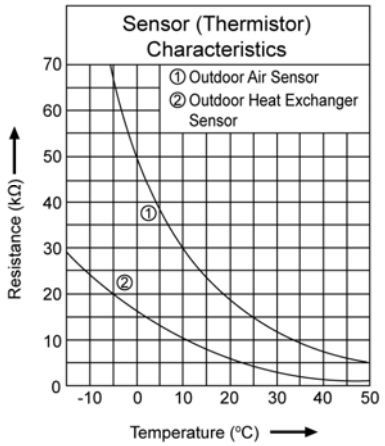
8. Electronic Circuit Diagram

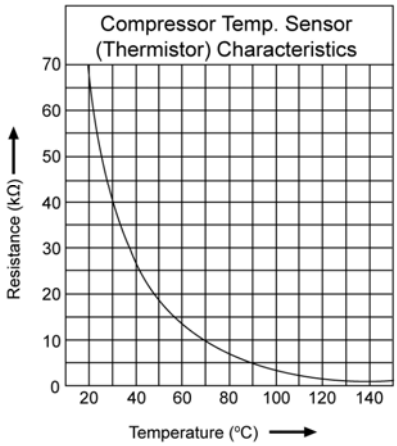
8.1 Indoor Unit



8.2 Outdoor Unit



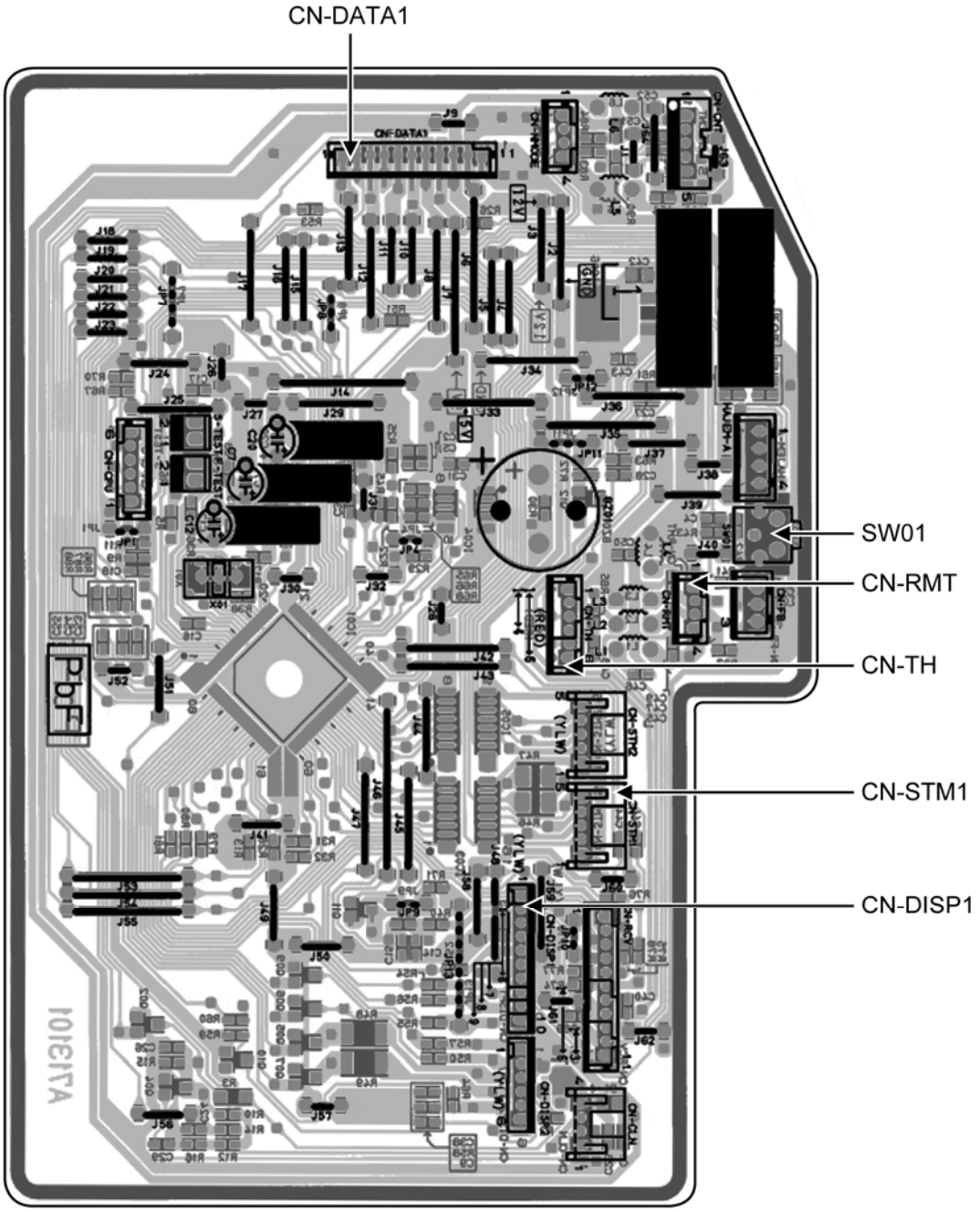




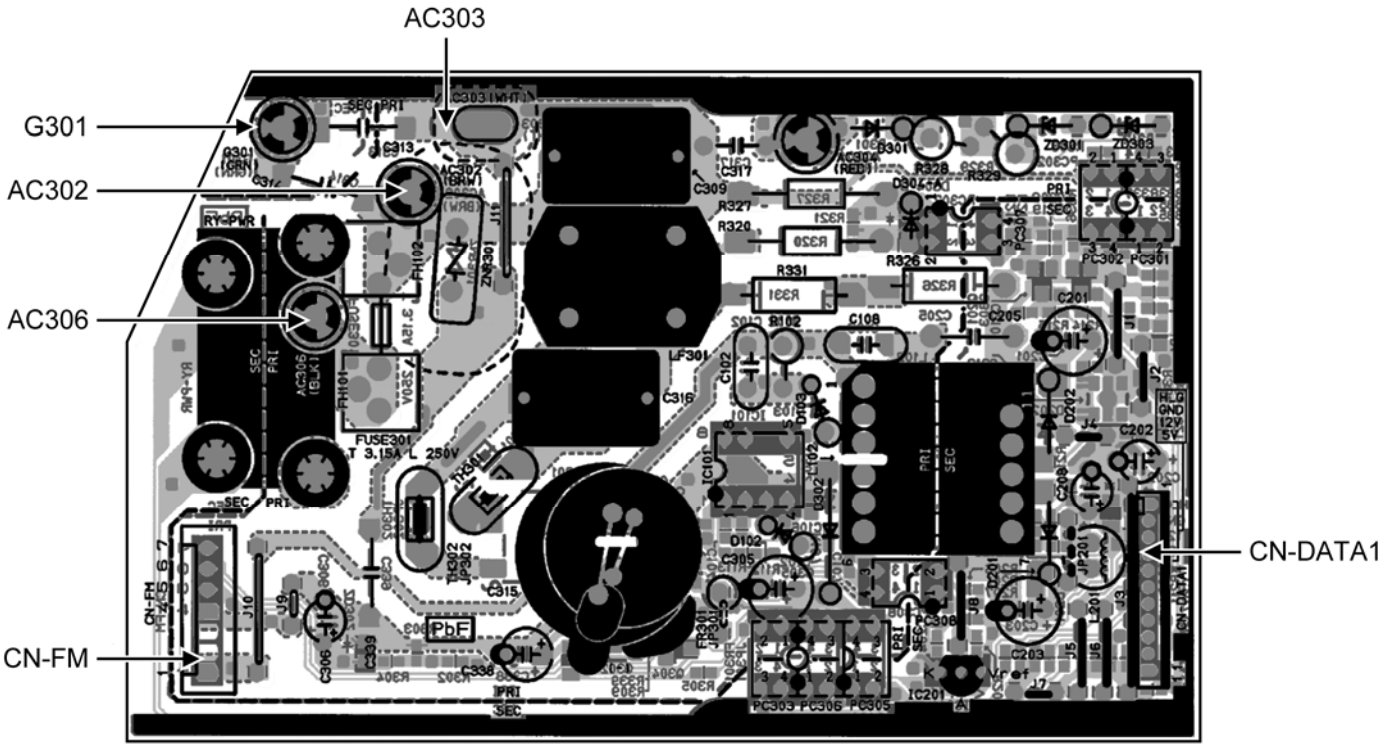
9. Printed Circuit Board

9.1 Indoor Unit

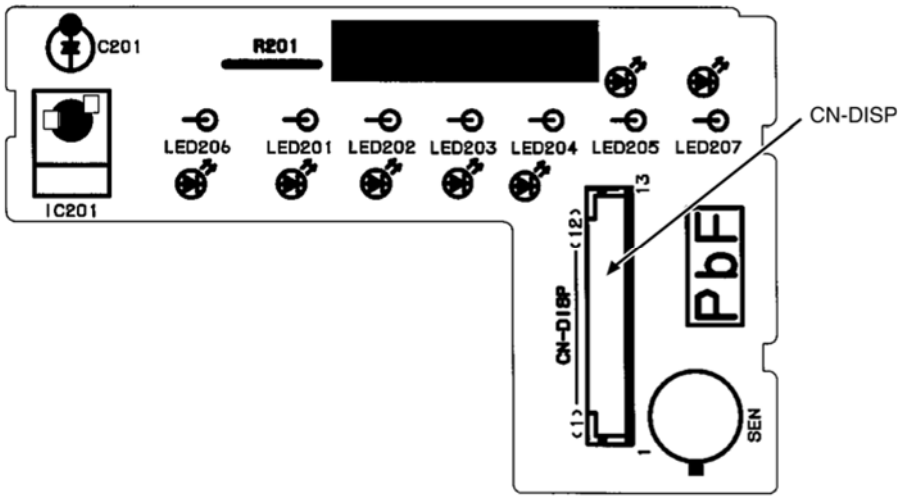
9.1.1 Main Printed Circuit Board



9.1.2 Power Printed Circuit Board

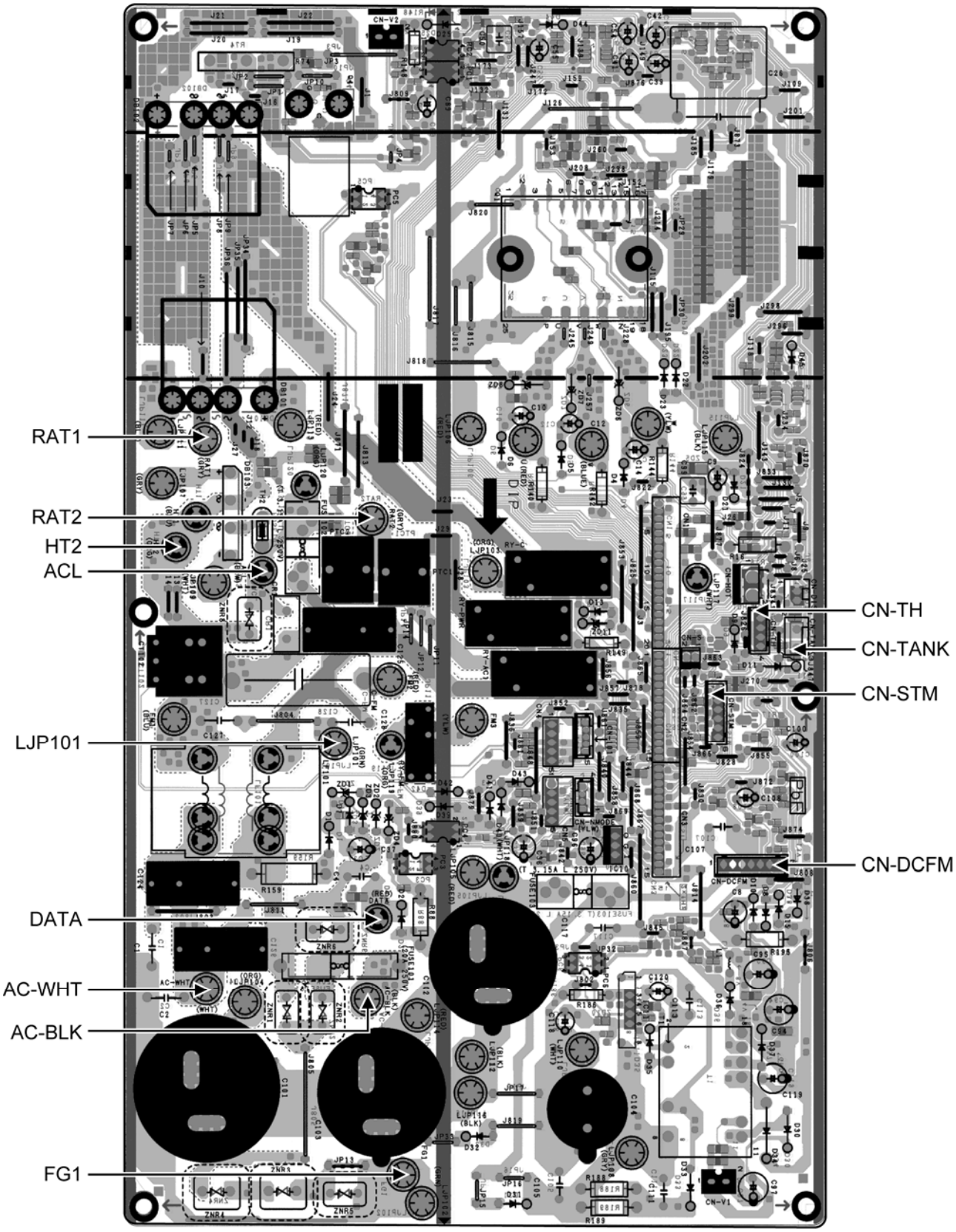


9.1.3 Indicator Printed Circuit Board



9.2 Outdoor Unit

9.2.1 Main Printed Circuit Board



10. Installation Instruction

10.1 S9NKUA S12NKUA

10.1.1 Select the Best Location

10.1.1.1 Indoor Unit

- Do not install the unit in excessive oil fume area such as kitchen, workshop and etc.
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 8.2 ft.

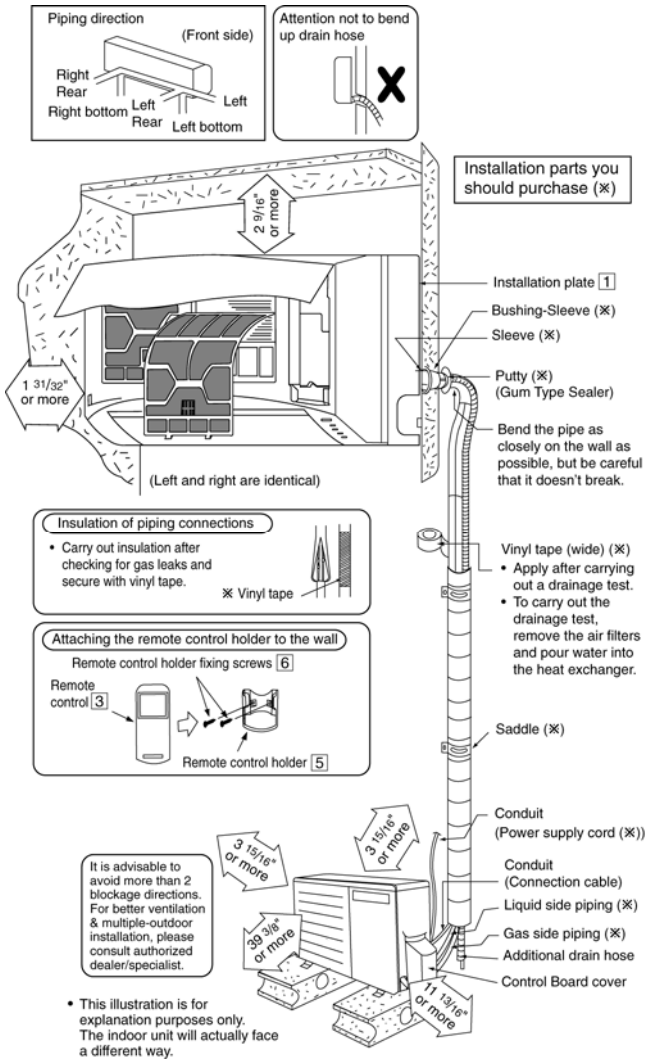
10.1.1.2 Outdoor Unit

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If piping length is over the [piping length for additional gas], additional refrigerant should be added as shown in the table.

Model	Capacity (Btu/h)	Piping size		Std. Length (ft)	Max. Elevation (ft)	Min. Piping Length (ft)	Max. Piping Length (ft)	Additional Refrigerant (oz/ft)	Piping Length for add. gas (ft)
		Gas	Liquid						
S9NKUA	8500	3/8"	1/4"	24.6	49.2	9.8	65.6	0.2	24.6
S12NKUA	12000	1/2"			49.2	9.8	65.6	0.2	24.6

Example: For S9NKUA
If the unit is installed at 32.8 ft distance, the quantity of additional refrigerant should be 1.64 oz .... (32.8 - 24.6) ft x 0.2 oz/ft = 1.64 oz.

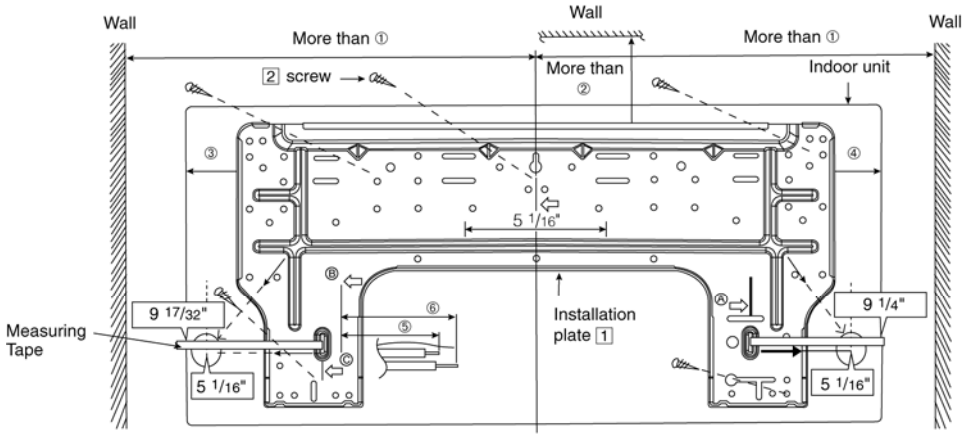
10.1.2 Indoor/Outdoor Unit Installation Diagram


Piping direction
(Front side)
Right Rear
Right bottom
Left Rear
Left
Left bottom
Attention not to bend up drain hose
Installation parts you should purchase (※)
2 9/16" or more
1 31/32" or more
(Left and right are identical)
Installation plate 1
Bushing-Sleeve (※)
Sleeve (※)
Putty (※) (Gum Type Sealer)
Bend the pipe as closely on the wall as possible, but be careful that it doesn't break.
Insulation of piping connections
• Carry out insulation after checking for gas leaks and secure with vinyl tape.
※ Vinyl tape
Vinyl tape (wide) (※)
• Apply after carrying out a drainage test.
• To carry out the drainage test, remove the air filters and pour water into the heat exchanger.
Attaching the remote control holder to the wall
Remote control holder fixing screws 6
Remote control 3
Remote control holder 5
Saddle (※)
Conduit (Power supply cord (※))
3 15/16" or more
3 15/16" or more
It is advisable to avoid more than 2 blockage directions. For better ventilation & multiple-outdoor installation, please consult authorized dealer/specialist.
39 3/8" or more
Conduit (Connection cable)
Liquid side piping (※)
Gas side piping (※)
Additional drain hose
Control Board cover
11 13/16" or more
• This illustration is for explanation purposes only. The indoor unit will actually face a different way.

10.1.3 Indoor Unit

10.1.3.1 How to Fix Installation Plate

The mounting wall shall be strong and solid enough to prevent if from the vibration.



Model	Dimension					
	①	②	③	④	⑤	⑥
S9NKUA, S12NKUA	19 3/32"	3 7/32"	6 1/2"	6 7/32"	1 11/16"	3 3/4"

The centre of installation plate should be at more than ① at right and left of the wall.
The distance from installation plate edge to ceiling should more than ②.
From installation plate left edge to unit's left side is ③.
From installation plate right edge to unit's right side is ④.

Ⓑ : For left side piping, piping connection for liquid should be about ⑤ from this line.

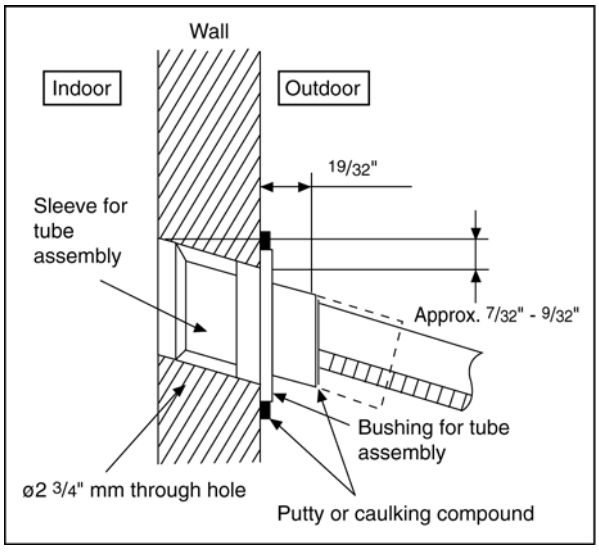
: For left side piping, piping connection for gas should be about ⑥ from this line.

1 Mount the installation plate on the wall with 5 screws or more (at least 5 screws).
(If mounting the unit on the concrete wall, consider using anchor bolts.)
   - o Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.

2 Drill the piping plate hole with ø2 ¾" hole-core drill.
   - o Line according to the left and right side of the installation plate. The meeting point of the extended line is the center of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole center is obtained by measuring the distance namely 5 1/16" for left and right hole respectively.
   - o Drill the piping hole at either the right or the left and the hole should be slightly slanting to the outdoor side.

10.1.3.2 To Drill a Hole in the Wall and Install a Sleeve of Piping

1 Insert the piping sleeve to the hole.
2 Fix the bushing to the sleeve.
3 Cut the sleeve until it extrudes about 19/32" from the wall.

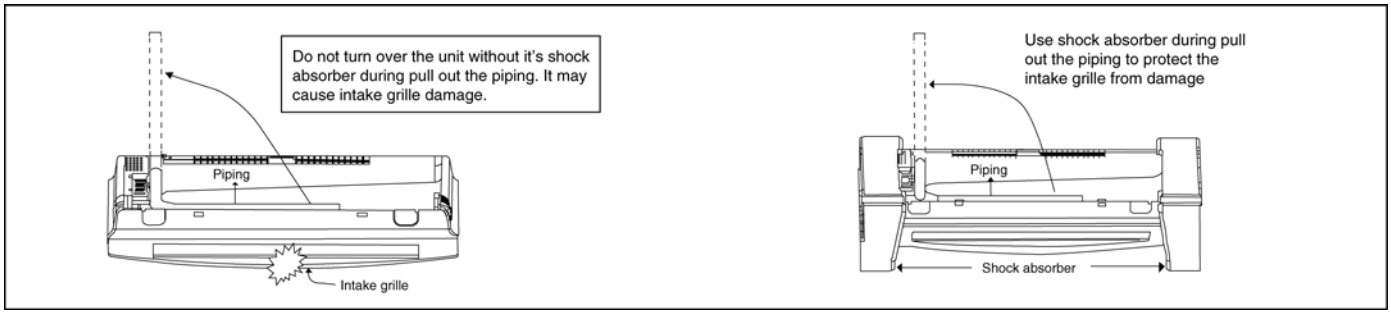


⚠ CAUTION

When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connection cable.

4 Finish by sealing the sleeve with putty or caulking compound at the final stage.

10.1.3.3 Indoor Unit Installation


Do not turn over the unit without it's shock absorber during pull out the piping. It may cause intake grille damage.
Piping
Intake grille
Use shock absorber during pull out the piping to protect the intake grille from damage
Piping
Shock absorber

10.1.3.4 For the right rear piping

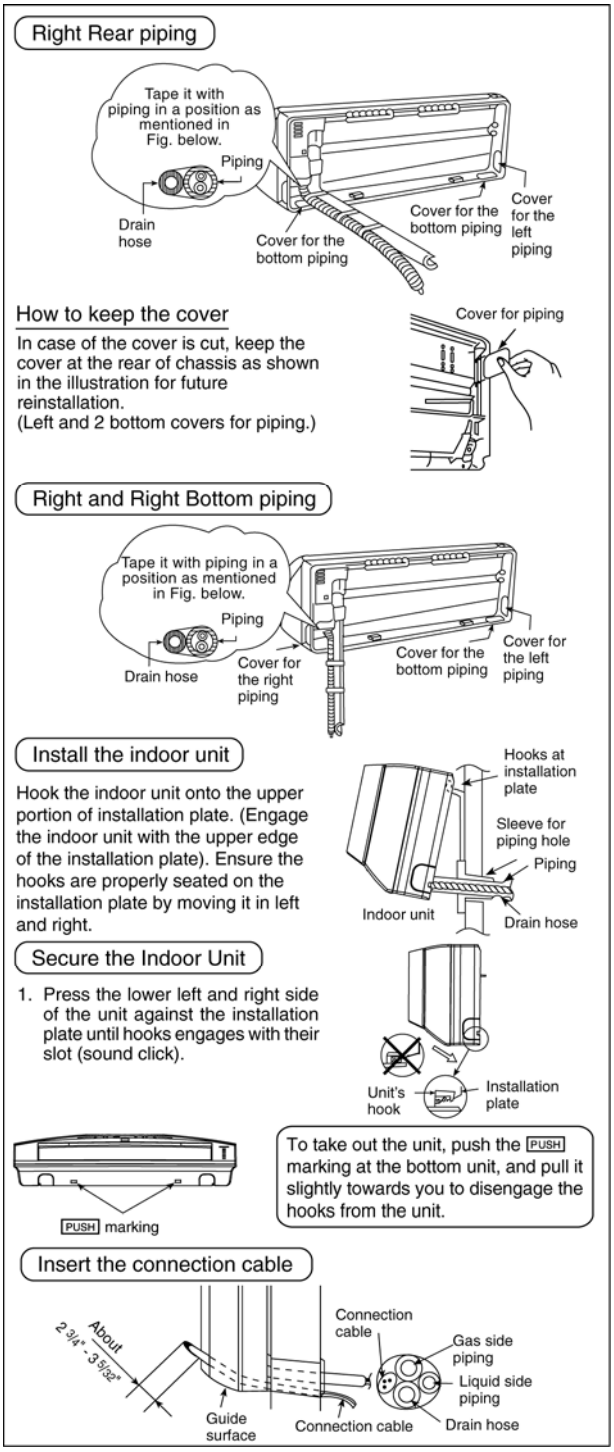
- Step-1 Pull out the Indoor piping
- Step-2 Install the Indoor Unit
- Step-3 Secure the Indoor Unit
- Step-4 Insert the connection cable

10.1.3.5 For the right bottom piping

- Step-1 Pull out the Indoor piping
- Step-2 Install the Indoor Unit
- Step-3 Insert the connection cable
- Step-4 Secure the Indoor Unit

10.1.3.6 For the embedded piping

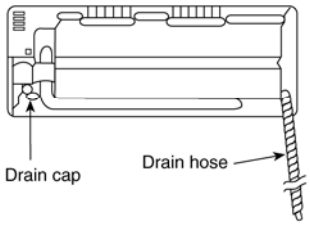
- Step-1 Replace the drain hose
- Step-2 Bend the embedded piping
  - Use a spring bender or equivalent to bend the piping so that the piping is not crushed.
- Step-3 Pull the connection cable into Indoor Unit
  - The inside and outside connection cable can be connected without removing the front grille.
- Step-4 Cut and flare the embedded piping
  - When determining the dimensions of the piping, slide the unit all the way to the left on the installation plate.
  - Refer to the section "Cutting and flaring the piping".
- Step-5 Install the Indoor Unit
- Step-6 Connect the piping
  - Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)
- Step-7 Insulate and finish the piping
  - Please refer to "Insulation of piping connection" coloumn as mentioned in indoor/outdoor unit installation.
- Step-8 Secure the Indoor Unit

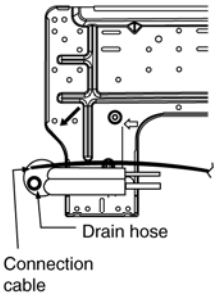

Right Rear piping
Tape it with piping in a position as mentioned in Fig. below.
Piping
Drain hose
Cover for the bottom piping
Cover for the bottom piping
Cover for the left piping
How to keep the cover
In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.
(Left and 2 bottom covers for piping.)
Cover for piping
Right and Right Bottom piping
Tape it with piping in a position as mentioned in Fig. below.
Piping
Drain hose
Cover for the right piping
Cover for the bottom piping
Cover for the left piping
Install the indoor unit
Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.
Hooks at installation plate
Sleeve for piping hole
Piping
Indoor unit
Drain hose
Secure the Indoor Unit
1. Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).
Unit's hook
Installation plate
PUSH marking
To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.
Insert the connection cable
About 2 3/4" - 3 5/32"
Guide surface
Connection cable
Connection cable
Gas side piping
Liquid side piping
Drain hose

(This can be used for left rear piping and bottom piping also.)

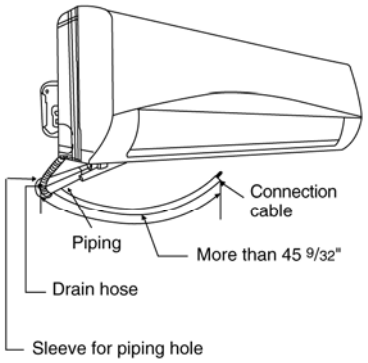
Replace the drain hose

Rear view for left piping installation

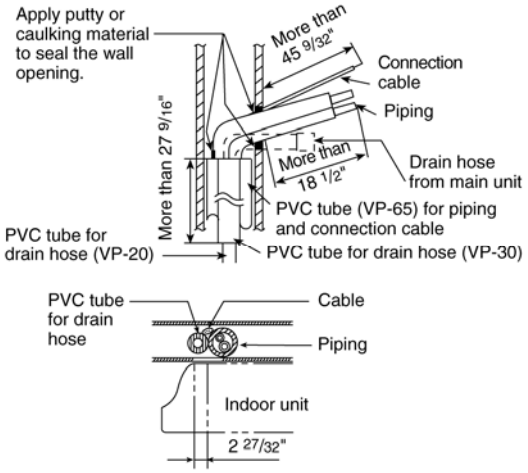




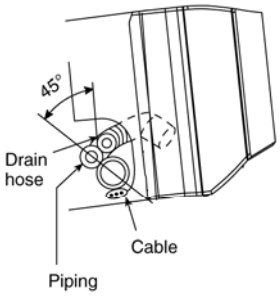
Adjust the piping slightly downwards.



- How to pull the piping and drain hose out, in case of the embedded piping.


Apply putty or caulking material to seal the wall opening.
More than 45 9/32"
Connection cable
Piping
More than 27 9/16"
More than 18 1/2"
Drain hose from main unit
PVC tube (VP-65) for piping and connection cable
PVC tube for drain hose (VP-20)
PVC tube for drain hose (VP-30)
PVC tube for drain hose
Cable
Piping
Indoor unit
2 27/32"

- In case of left piping how to insert the connection cable and drain hose.



(For the right piping, follow the same procedure)

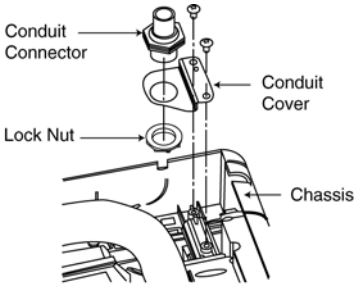
10.1.3.7 Connect the Cable to the Indoor Unit

1. The inside and outside connection cable can be connected without removing the front grille.
2. Unscrew the conduit cover and fix the conduit connector to conduit cover with lock nut, then secure it against chassis.
3. Connection cable between indoor unit and outdoor unit should be UL listed or CSA approved 4 conductor wires minimum AWG16 in accordance with local electric codes.
   - o Ensure the colour of wires of outdoor unit and terminal number are the same as the indoor's respectively.

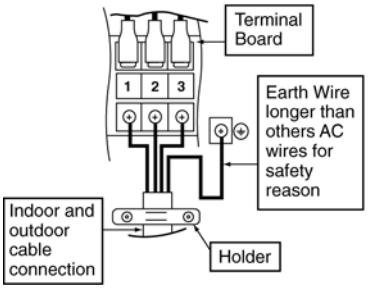
Terminals on the indoor unit	1	2	3	⏚
Colour of wires (connection wire)				
Terminals on the outdoor unit	1	2	3	⏚

⚠ WARNING
⏚ This equipment must be properly earthed.

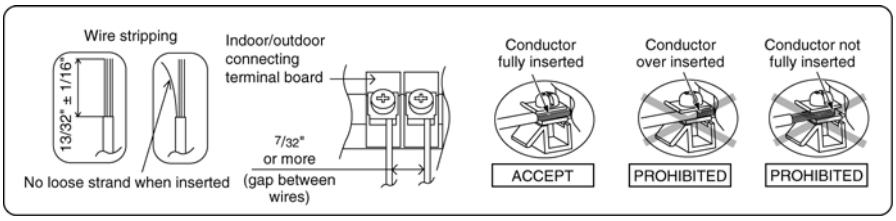
   - o Earth lead wire shall be Yellow/Green (Y/G) in colour and shall be longer than other lead wires as shown in the figure for electrical safety in case of the slipping.



Rear Side of Indoor Unit

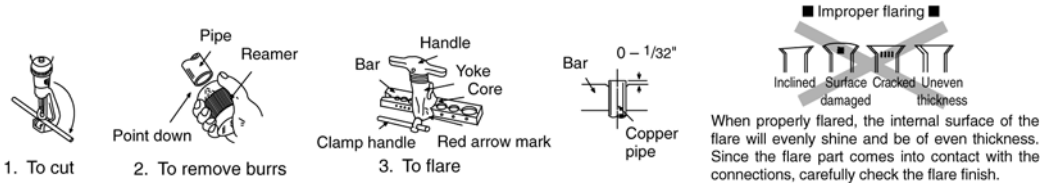

Terminal Board
1 2 3
Earth Wire longer than others AC wires for safety reason
Indoor and outdoor cable connection
Holder

10.1.3.8 Wire Stripping and connecting requirement



10.1.3.9 Cutting and flaring the piping

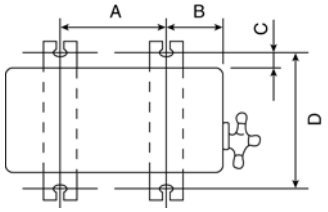
1 Please cut using pipe cutter and then remove the burrs.
2 Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
3 Please make flare after inserting the flare nut onto the copper pipes.



10.1.4 Outdoor Unit

10.1.4.1 Install the Outdoor Unit

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
  1 Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø13/32”).
  2 When installing at roof, please consider strong wind and earthquake.
  Please fasten the installation stand firmly with bolt or nails.



Model	A	B	C	D
S9NKUA, S12NKUA	22 7/16”	4 1/8”	23/32”	12 19/32”

10.1.4.2 Connect the Piping

Do not overtighten, over tightening may cause gas leakage.

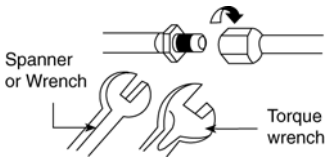
Piping size	Torque
1/4”	13.3 lbf.ft
3/8”	31.0 lbf.ft
1/2”	40.6 lbf.ft
5/8”	47.9 lbf.ft
3/4”	73.8 lbf.ft

10.1.4.2.1 Connecting The Piping to Indoor

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

Connect the piping

- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.



10.1.4.2.2 Connecting The Piping to Outdoor

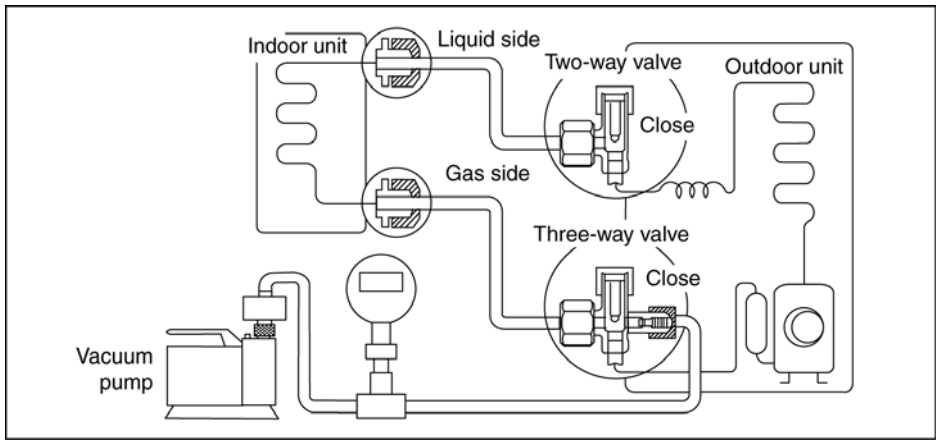
Decide piping length and then cut by using pipe cutter.
Remove burrs from cut edge.
Make flare after inserting the flare nut (locate at valve) onto the copper pipe.
Align center of piping to valve and then tighten with torque wrench to the specified torque as stated in the table.

10.1.4.2.3 Gas Leaking Checking

Pressure test to system to 400 PSIG with dry nitrogen, in stages. Thoroughly leak check the system.
If the pressure holds, release the nitrogen and proceed to section 10.1.4.3.

10.1.4.3 Evacuation of the equipment

WHEN INSTALLATION AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedures.



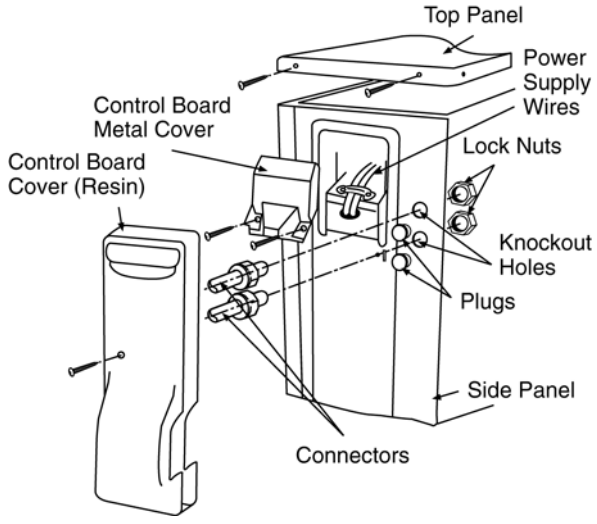
1. Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
2. Connect the micron gauge between vacuum pump and service port of outdoor units.
3. Turn on the power switch of the vacuum pump and make sure that connect digital micron gauge and to pull down to a value of 500 microns.
4. To make sure micron gauge a value 500 microns and close the low side valve of the charging set and turn off the vacuum pump.
5. Disconnect the vacuum pump hose from the service port of the 3-way valve.
6. Tighten the service port caps of the 3-way valve at a torque of 13.3 lbf.ft with a torque wrench.
7. Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to “Open” using a hexagonal wrench (5/32”).
8. Mount valve caps onto the 2-way valve and the 3-way valve.
   - Be sure to check for gas leakage.

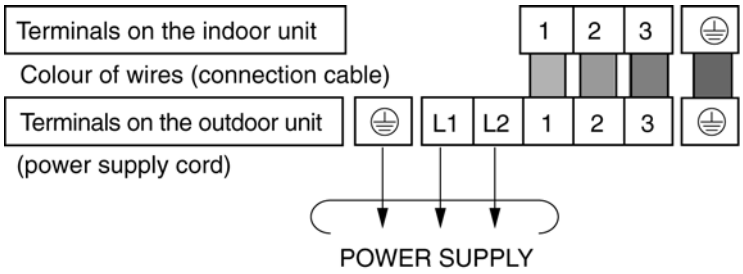
⚠ CAUTION

- If micron gauge value does not descend 500 microns, take the following measures:
- If the leak stops when the piping connections are tightened further, continue working from step ③.
- If the leak does not stop when the connections are retightened, repair location of leak.
- Do not release refrigerant during piping work for installation and reinstallation.
- Be careful with the liquid refrigerant, it may cause frostbite.

10.1.4.4 Connect the Cable to the Outdoor Unit

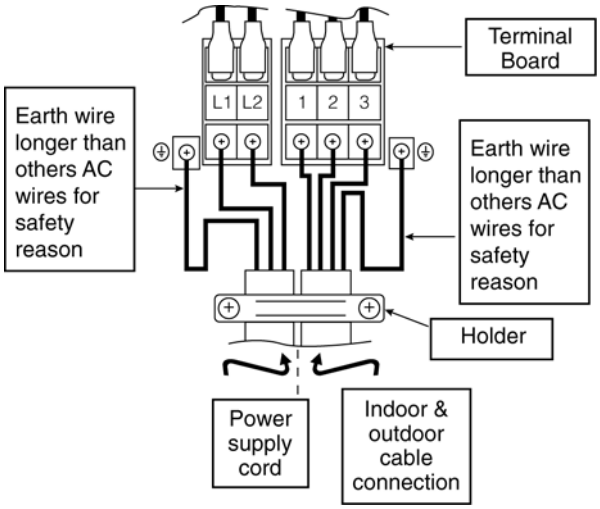
1. Remove Top panel.
2. Remove Control Board Cover (Resin and Metal).
3. Remove Plugs.
4. Fix the conduit connectors to the knockout holes with lock-nuts, then secure them against the side panel.
5. All wires pass through conduits.
6. Connection cable between indoor unit and outdoor unit should be UL listed or CSA approved 4 conductor wires minimum AWG16 in accordance with local electric codes.
7. Wire connection to the power supply (208/230V 60Hz) through circuit breaker.
   - Connect the UL listed or CSA approved wires minimum AWG14 to the terminal board, and connect the other end of the wires to ELCB / GFCI.
8. Connect the power supply cord and connection cable between indoor unit and outdoor unit according to the diagram below.




Terminals on the indoor unit
1 2 3
Colour of wires (connection cable)
Terminals on the outdoor unit
L1 L2 1 2 3
(power supply cord)
POWER SUPPLY

9. Secure the wire onto the control board with the holder (clamper).
10. After completing wiring connections, reattach the control board cover (Metal and Resin) and the top panel to the original position with the screws.
11. For wire stripping and connection requirement, refer to instruction ⑤ of indoor unit.

- Earth lead wire shall be Yellow/Green (Y/G) in colour and shall be longer than other lead wires as shown in the figure for electrical safety in case of the slipping.


Terminal Board
L1 L2
1 2 3
Earth wire longer than others AC wires for safety reason
Earth wire longer than others AC wires for safety reason
Holder
Power supply cord
Indoor & outdoor cable connection

10.1.4.5 Piping Insulation

1. Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.
2. If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness ¼" or above.

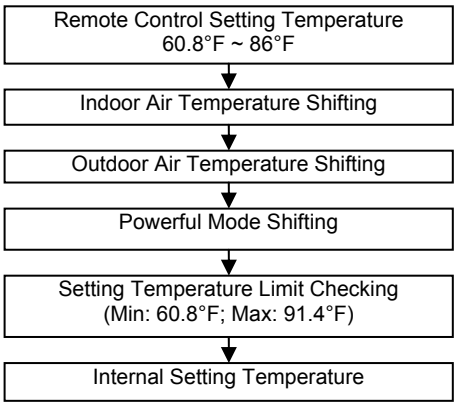
11. Operation Control

11.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operation mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operation mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal setting temperature and intake air temperature.

11.1.1 Internal Setting Temperature

Once the operation starts, remote control setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



11.1.2 Cooling Operation

11.1.2.1 Thermostat control

- Compressor is OFF when intake Air Temperature - Internal Setting Temperature < 29.3°F.
- Compressor is ON after waiting for 3 minutes, if the Intake Temperature - Internal Setting Temperature > Compressor OFF point.

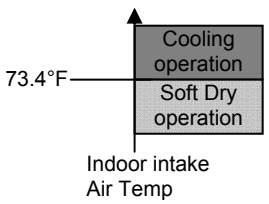
11.1.3 Soft Dry Operation

11.1.3.1 Thermostat control

- Compressor is OFF when Intake Temperature - Internal Setting Temperature < 28.4°F.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

11.1.3.2 Automatic Operation

- This mode can be set using remote control and the operation is decided by indoor intake air temperature.
- During operation mode judgment at the beginning of the Auto Mode operation, indoor fan motor (with speed of Lo-) is running for 30 seconds to detect the indoor intake air temperature.
- The operation mode is decided based on below chart.



- After the operation mode is decided, the unit operation will follow the respective operation mode control.

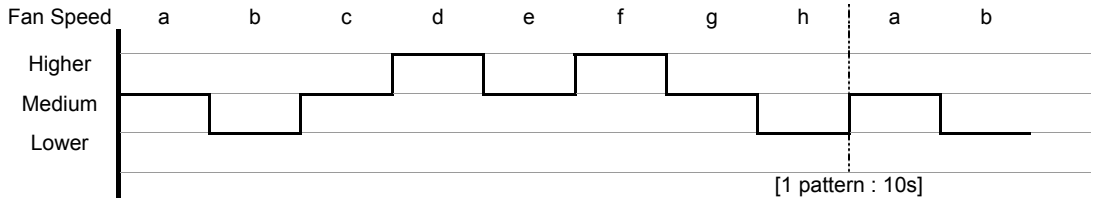
11.2 Indoor Fan Motor Operation

11.2.1 Basic Rotation Speed

- Manual Fan Speed
  - o Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	Hi	Me+	Me	Me-	Lo

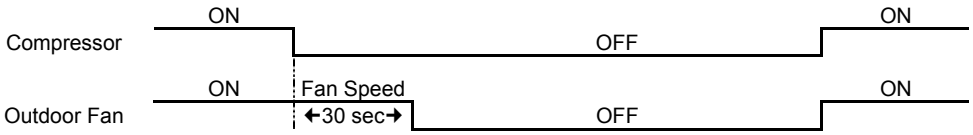
- Auto Fan Speed
  - o According to room temperature and setting temperature, indoor fan speed is determined automatically.
  - o The indoor fan will operate according to pattern below.



- Feedback control
  - o Immediately after the fan motor is started, feedback control is performed once every second.
  - o During fan motor on, if fan motor feedback ≥ 2550 rpm or <50 rpm continuously for 10 seconds, the fan motor error counter increased; fan motor is then stopped and restarted. If the fan motor error counter increased to 7, then H19 – fan motor error is detected. Operation stopped and could not be restarted.

11.3 Outdoor Fan Motor Operation

Outdoor fan motor is operated with fan speed number of rotations. Outdoor fan turns on when compressor starts to operate. But outdoor fan will turns off 30 seconds after compressor stops to operate.



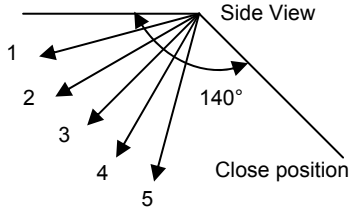
11.4 Airflow Direction

- There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).
- Control of airflow direction can be automatic (angles of direction is determined by operation mode, heat exchanger temperature and intake air temperature) and manual (angles of direction can be adjusted using remote control).

11.4.1 Vertical Airflow

Operation Mode	Airflow Direction	Vane Angle (°)				
		1	2	3	4	5
Cooling	Auto	20 ~ 45				
	Manual	20	26	32	37	45
Soft Dry	Auto	20 ~ 45				
	Manual	20	26	32	37	45

- Automatic vertical airflow direction can be set using remote control; the vane swings up and down within the angles as stated above. It does not swing during fan motor stop. When the air conditioner is stopped using remote control, the vane will shift to close position.
- Manual vertical airflow direction can be set using remote control; the angles of the vane are as stated above and the positions of the vane are as figure below. When the air conditioner is stopped using remote control, the vane will shift to close position.



11.4.2 Horizontal Airflow

11.4.2.1 S9NK, S12NK

The horizontal airflow direction louvers can be adjusted manually by hand.

11.5 Quiet Operation (Cooling Mode/Cooling Area of Dry Mode)

- Purpose
  - To provide quiet cooling operation compare to normal operation.

- Control condition
  - Quiet operation start condition
    - When Quiet button at remote control is pressed Quiet INDICATOR illuminates.
  - Quiet operation stop condition
    - When one of the following conditions is satisfied, quiet operation stops:
      - Powerful button is pressed.
      - Stop by OFF/ON button.
      - OFF Timer activates.
      - Quiet button is pressed again.
    - When quiet operation is stopped, operation is shifted to normal operation with previous setting.
    - When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
    - When operation mode is changed, quiet operation is shifted to quiet operation of the new mode.
    - During quiet operation, if ON timer activates, quiet operation maintains.
    - After off, when on back, quiet operation is not memorized.

- Control content
  - Fan speed is changed from normal setting to quiet setting of respective fan speed. This is to reduce sound of Hi, Me, Lo for 3dB (more than 3dB for some models).
  - Fan speed for quiet operation is -1 step from setting fan speed.

11.6 Powerful Mode Operation

- When the powerful mode is selected, the internal setting temperature will shift lower up to 35.6°F (for Cooling/Soft Dry) than remote control setting temperature for 20 minutes and the fan speed will increase to achieve the setting temperature quickly.
- Powerful operation stops condition
  - o When one of the following condition is satisfied, powerful operation stops:
    - Quiet button is pressed.
    - Stop by OFF/ON button.
    - OFF Timer activates.
    - Powerful button is pressed again.
    - Powerful operation continue for 20 minutes.

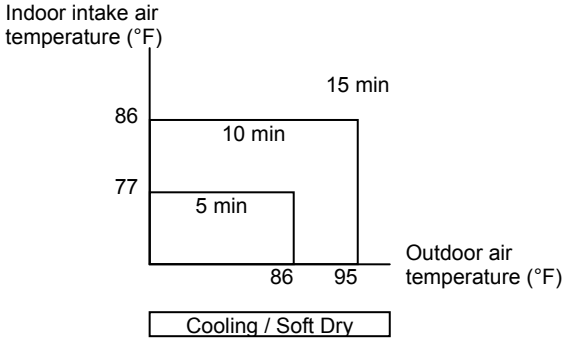
11.7 Timer Control

11.7.1 ON Timer Control

ON timer can be set using remote control, the unit with timer set will start operate earlier than the setting time. This is to provide a comfortable environment when reaching the set ON time.

60 minutes before the set time, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 30 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation starting time.

From the judgment, the decided operation will start operation earlier than the set time as shown below.



11.7.2 OFF Timer Control

OFF timer can be set using remote control, the unit with timer set will stop operate at set time.

11.8 Random Auto Restart Control

- When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes. There are 10 patterns to be selected randomly after power supply resumes.
- This control is not applicable during OFF/ON Timer setting.

11.9 Indication Panel

LED	POWER	TIMER	QUIET	POWERFUL
Color	Green	Orange	Orange	Orange
Light ON	Operation ON	Timer Setting ON	Quiet Mode ON	Powerful Mode ON
Light OFF	Operation OFF	Timer Setting OFF	Quiet Mode OFF	Powerful Mode OFF

Note:

- If POWER LED blinks, the possible operation of the unit is operation mode judgment, or ON timer sampling.
- If TIMER LED blinks, there is an abnormal operation occurs.

12. Protection Control

12.1 Restart Control (Time Delay Safety Control)

- The compressor will not turn on within 3 minutes from the moment operation stops, although the unit is turned on again by pressing OFF/ON button at remote control within this period.
- This control is not applicable if the power supply is cut off and on again.
- This phenomenon is to balance the pressure inside the refrigerant cycle.

12.2 30 Seconds Forced Operation

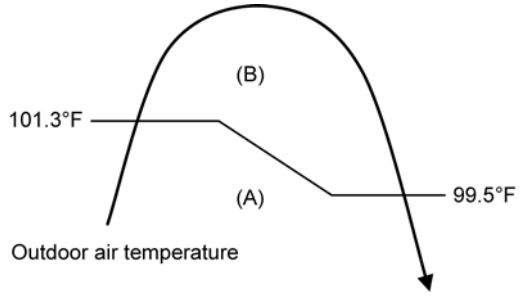
- Once the air conditioner is turned on, the compressor will not stop within 30 seconds in a normal operation although the intake air temperature has reached the thermo-off temperature. However, force stop by pressing the OFF/ON button at the remote control is permitted or the Auto OFF/ON button at indoor unit.
- The reason for the compressor to force operation for minimum 30 seconds is to allow the refrigerant oil run in a full cycle and return back to the outdoor unit.

12.3 Total Running Current Control

- When the outdoor unit total running current (AC) exceeds X value, the frequency instructed for compressor operation will be decreased.
- If the running current does not exceed X value for 5 seconds, the frequency instructed will be increased.

Model	S9***	S12***
Operation Mode	X (A)	X (A)
Cooling / Soft Dry (A)	3.89	6.55
Cooling / Soft Dry (B)	3.28	6.10

- The first 30 minutes of cooling operation, (A) will be applied.



S9NK, S12NK

12.4 IPM (Power Transistor) Prevention Control

12.4.1 S9NK, S12NK

- Overheating Prevention Control
  - o When the IPM temperature rises to 212°F, compressor operation will stop immediately.
  - o Compressor operation restarts after 3 minutes the temperature decreases to 203°F.
- DC Peak Current Control
  - o When electric current to IPM exceeds set value of 18.5A, the compressor will stop operate. Then, operation will restart after 3 minutes.
  - o If the set value exceeds again more than 30 seconds after the compressor starts, the operation will restart after 2 minutes.
  - o If the set value exceeds again within 30 seconds after the compressor starts, the operation will restart after 1 minute. If this condition repeats continuously for 7 times, all indoor and outdoor relays will be cut off.
  - o Timer LED will be blinking (F99 is indicated).

12.5 Low Pressure Protection Control (Gas Leakage Detection)

- Control start conditions
  - o For 5 minutes, the compressor continously operates and outdoor total current is between 0.64A and 0.85A
  - o During Cooling and Soft Dry operation:
    Indoor suction temperature – indoor piping temperature is below 39.2°F
- Control contents
  - o Compressor stops (and restart after 3 minutes).
  - o If the conditions above happened 2 times within 20 minutes, the unit will:
    - Stop operation
    - Timer LED blinks and “F91” indicated.

12.6 Low Frequency Protection Control 1

- When the compressor operates at frequency lower than 24Hz continued for 240 minutes, the operation frequency will be changed to 23Hz for 2 minutes.

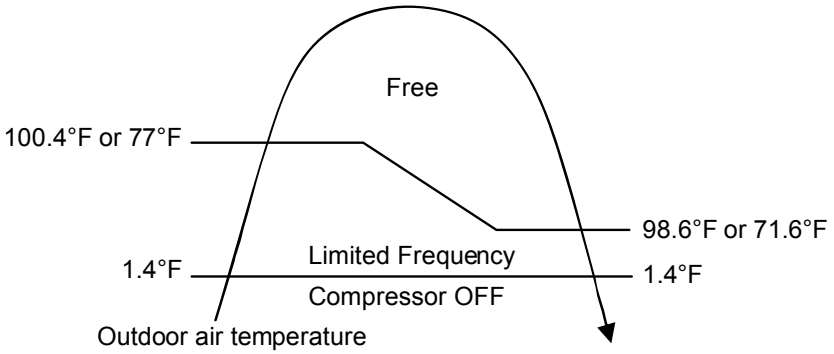
12.7 Low Frequency Protection Control 2

- When all below conditions comply, minimum limit of compressor frequency will be set.

Temperature, T, for:	Cooling / Soft Dry
	S9NK and S12NK
Indoor intake air (°F)	T < 57.2 or T ≥ 86
Outdoor air (°F)	T < 55.4 or T ≥ 100.4
Indoor heat exchanger (°F)	T < 86

12.8 Outdoor Air Temperature Control

- The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.
- This control will begin 1 minute after the compressor starts.
- Compressor frequency will adjust based on outdoor air temperature.



12.9 Cooling Overload Control

- Pipe temperature limitation / restriction.
  - o Detects the outdoor pipe temperature and carry out restriction / limitation below (Limit the compressor operation frequency)
  - o The compressor stops if outdoor pipe temperature exceeds 141.8°F.
  - o If the compressor stops 4 times in 20 minutes, Timer LED blinks (“F95” indicated: Outdoor high pressure rise protection)

12.10 Freeze Prevention Control

- When indoor heat exchanger temperature is lower than 32°F continuously for 6 minutes, compressor will stops operation.
- Compressor will resume its operation 3 minutes after the indoor heat exchanger is higher than 55.4°F.
- At the same time, indoor fan speed will be higher than during its normal operation.
- If the indoor heat exchanger temperature is higher than 55.4°F for 5 minutes, the fan speed will return to its normal operation.

12.11 Freeze Prevention Control 2

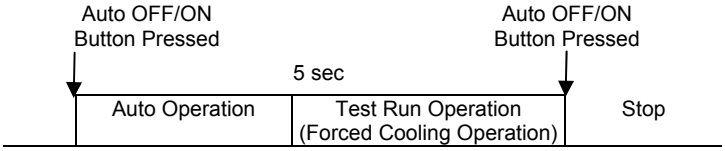
- Control start conditions
  - During Cooling operation and soft dry operation
    - During thermo OFF condition, indoor intake temperature is less than 50°F or
    - Compressor stops for freeze prevention control
  - Either one of the conditions above occurs 5 times in 60 minutes.
- Control contents
  - Operation stops
  - Timer LED blinks and “H99” indicated

12.12 Dew Prevention Control

- To prevent dew formation at indoor unit discharge area.
- This control will be activated if:
  - Outdoor air temperature and indoor pipe temperature judgment by micro controller is fulfilled.
  - When cooling or dry mode is operated more than 20 minutes.
- This control stopped if:
  - Compressor stopped.
  - Remote control setting changed (fan speed/temperature).
  - Outdoor air temperature and indoor intake temperature changed.
- Fan speed, angle of louver (vertical airflow angle) will be adjusted accordingly in this control.
  - Fan speed will be increased slowly when control is activated until predetermine value.
- Compressor frequency will be regulated accordingly.

13. Servicing Mode

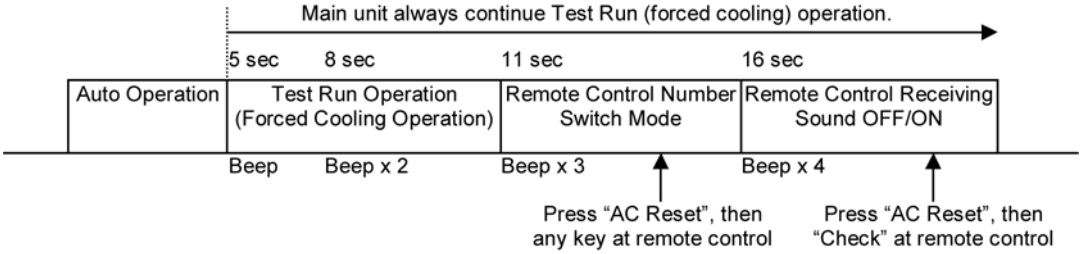
13.1 Auto Off/On Button



1 AUTO OPERATION MODE
The Auto Operation will be activated immediately once the Auto OFF/ON button is pressed. This operation can be used to operate air conditioner with limited function if remote control is misplaced or malfunction.

2 TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)
The Test Run Operation will be activated if the Auto OFF/ON button is pressed continuously for more than 5 seconds. A “beep” sound will be heard at the fifth seconds, in order to identify the starting of this operation.

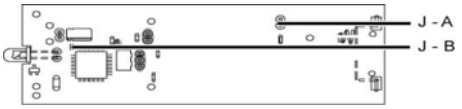
The Auto OFF/ON button may be used together with remote control to set / change the advance setting of air conditioner operation.



3 REMOTE CONTROL NUMBER SWITCH MODE
The Remote Control Number Switch Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 11 seconds (3 “beep” sounds will occur at 11th seconds to identify the Remote Control Number Switch Mode is in standby condition), press “AC Reset” button and then press any button at remote control to transmit and store the desired transmission code to the EEPROM.

There are 4 types of remote control transmission code could be selected. The indoor unit will only operate when received signal with same transmission code from remote control. This could prevent signal interference when there are 2 or more units installed nearby together.

To change remote control transmission code, short or open jumpers at the remote control printed circuit board.



Remote Control Printed Circuit Board		
Jumper A (J-A)	Jumper B (J-B)	Remote Control No.
Short	Open	A (Default)
Open	Open	B
Short	Short	C
Open	Short	D

4 REMOTE CONTROL RECEIVING SOUND OFF/ON MODE
The Remote Control Receiving Sound OFF/ON Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 16 seconds (4 “beep” sounds will occur at 16th seconds to identify the Remote Control Receiving Sound OFF/ON Mode is in standby condition) and press “AC Reset” button and then press “Check” button at remote control.

Press Auto OFF/ON button to toggle remote control receiving sound.
- Short “beep”: Turn ON remote control receiving sound.
- Long “beep”: Turn OFF remote control receiving sound.

After Auto OFF/ON button is pressed, the 20 seconds counter for Remote Control Receiving Sound OFF/ON Mode is restarted.

13.2 Remote Control Button

13.2.1 SET Button

- To check remote control transmission code and store the transmission code to EEPROM
  - Press “Set” button continuously for 10 seconds by using pointer
  - Press “Timer Set” button unit a “beep” sound is heard as confirmation of transmission code change.

13.2.2 RESET (RC)

- To clear and restore the remote control setting to factory default.
  - Press once to clear the memory

13.2.3 RESET (AC)

- To restore the unit’s setting to factory default.
  - Press once to restore the unit’s setting

13.2.4 TIMER ▲

- To change indoor unit indicators’ intensity:
  - Press continuously for 5 seconds.

13.2.5 TIMER ▼

- To change remote control display from Degree Celsius (°C) to Degree Fahrenheit (°F)
  - Press continuously for 10 seconds.

14. Troubleshooting Guide

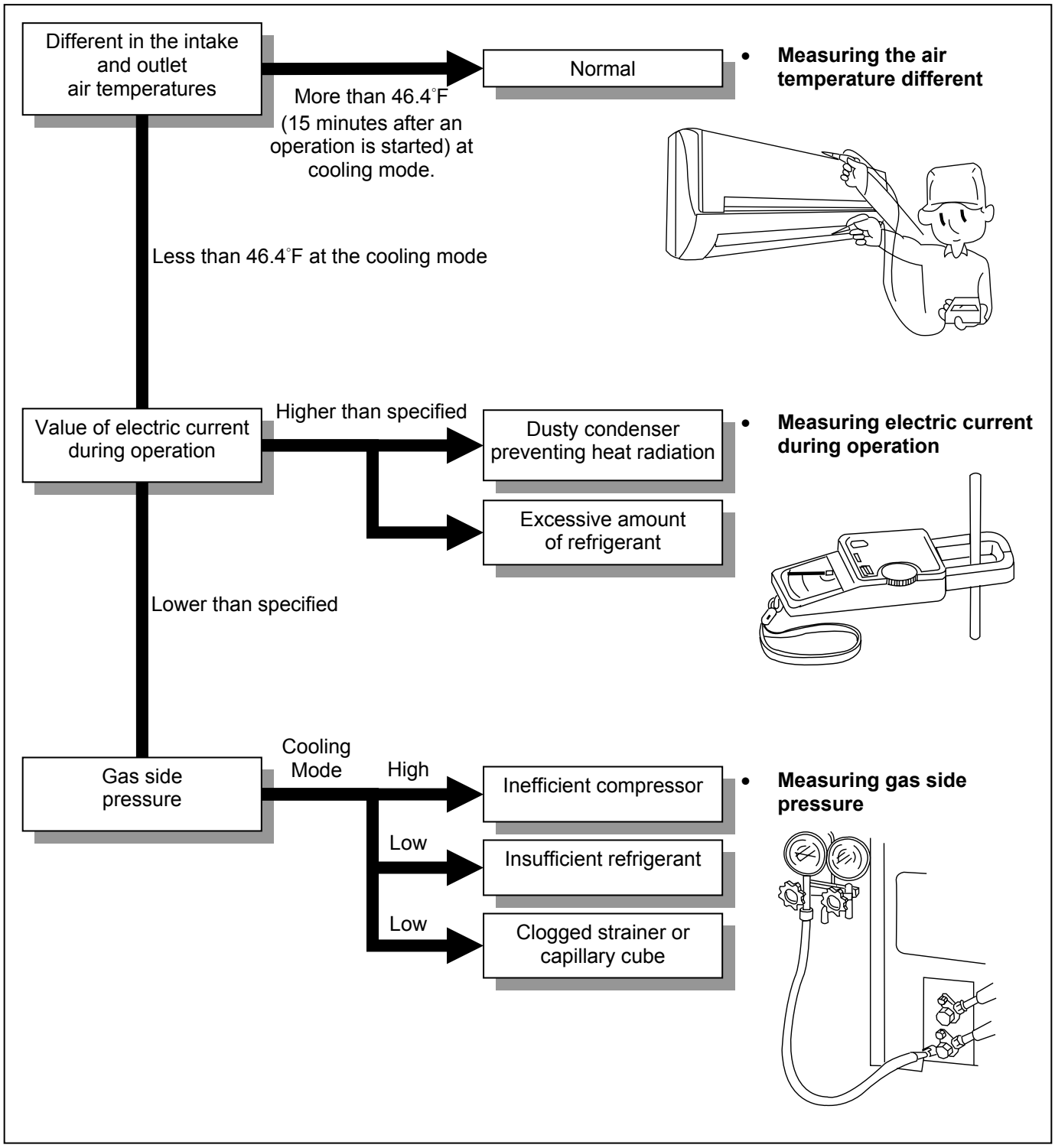
14.1 Refrigeration Cycle System

In order to diagnose malfunctions, ensure the air conditioner is free from electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan. The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table to the right.

Normal Pressure and Outlet Air Temperature (Standard)

	Gas Pressure PSI (kg/cm^2G)	Outlet air Temperature (°F)
Cooling Mode	130.5 ~ 174.0 (9 ~ 12)	53.6 ~ 60.8

Condition: Indoor fan speed = High
Outdoor temperature = 95°F at cooling mode.
Compressor operate at rated frequency


Different in the intake and outlet air temperatures
Normal
More than 46.4˚F (15 minutes after an operation is started) at cooling mode.
Less than 46.4˚F at the cooling mode
Value of electric current during operation
Higher than specified
Dusty condenser preventing heat radiation
Excessive amount of refrigerant
Lower than specified
Gas side pressure
Cooling Mode
High
Inefficient compressor
Low
Insufficient refrigerant
Low
Clogged strainer or capillary cube
• Measuring the air temperature different
• Measuring electric current during operation
• Measuring gas side pressure

14.1.1 Relationship between the condition of the air conditioner and pressure and electric current

Condition of the air conditioner	Cooling Mode		
	Low Pressure	High Pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	↘	↘	↘
Clogged capillary tube or strainer	↘	↘	↘
Short circuit in the indoor unit	↘	↘	↘
Heat radiation deficiency of the outdoor unit	↗	↗	↗
Inefficient compression	↗	↘	↘

• Carry out the measurement of pressure, electric current, and temperature fifteen minutes after an operation is started.

14.2 Breakdown Self Diagnosis Function

14.2.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

- Once error occurred during operation, the unit will stop its operation, and Timer LED blinks.
- Although Timer LED goes off when power supply is turned off, if the unit is operated under a breakdown condition, the LED will ON again.
- In operation after breakdown repair, the Timer LED will not blink. The last error code (abnormality) will be stored in IC memory.

14.2.2 To Make a Diagnosis

1 Timer LED starts to blink and the unit automatically stops the operation.
2 Press the CHECK button on the remote control continuously for 5 seconds.
3 "- -" will be displayed on the remote control display.
Note: Display only for "- -" (No signal transmission, no receiving sound and no Power LED blinking)
4 Press the TIMER ▲ or ▼ button on the remote control. The code "H00" (no abnormality) will be displayed and signal will be transmit to the main unit.
5 Each press of the button (▲ or ▼) will increase error code number and transmit error code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote control are matched, Power LED will light up for 30 seconds and a "beep" sound (continuously for 4 seconds) will be heard. If no codes are matched, Power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The LED will be off if the unit is turned off or the RESET button on the main unit is pressed.

14.2.3 To Display Memorized Error Code (Protective Operation)

1 Turn power on.
2 Press the CHECK button on the remote control
3 "- -" will be displayed on the remote control display.
Note: Display only for "- -" (No signal transmission, no receiving sound and no Power LED blinking)
4 Press the TIMER ▲ or ▼ button on the remote control. The code "H00" (no abnormality) will be displayed and signal will be transmit to the main unit.
5 Each press of the button (▲ or ▼) will increase error code number and transmit error code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote control are matched, Power LED will light up for 30 seconds and a "beep" sound (continuously for 4 seconds) will be heard. If no codes are matched, Power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The same diagnosis can be repeated by turning power on again.

14.2.4 To Clear Memorized Error Code after Repair (Protective Operation)

1 Turn power on (in standby condition).
2 Press the AUTO button for 5 seconds (a "beep" sound is heard) on the main unit to operate the unit at Forced Cooling Operation Mode.
3 Press the CHECK button on the remote control for about 1 second with a pointed object to transmit signal to main unit. A "beep" sound is heard, and the Error Code is cleared.

14.2.5 Temporary Operation (Depending On Breakdown Status)

1 Press the Auto OFF/ON button on the main unit (a "beep" sound is heard) to operate the unit. (Remote control is enable again).
2 The unit can be temporarily be used until repaired.

Error Code	Operation	Temporary items
H23	Cooling	Emergency Operation with limited power
H27, H28	Cooling	

14.3 Error Code Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgment	Emergency Operation	Primary location to verify
H00	No abnormality detected	-	Normal operation	
H11	Indoor / Outdoor abnormal communication	> 1 min after starting operation	Indoor fan operation only	• Internal / external cable connection • Indoor / outdoor PCB
H12	Connection capability rank abnormality	Continuously for 90 sec after power supplied	-	-
H14	Indoor intake air temperature sensor abnormality	Continue for 5 sec.	-	• Intake air temperature sensor (defective or disconnected)
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	-	• Compressor temperature sensor (defective or disconnected)
H16	Outdoor current transformer open circuit	-	-	• Outdoor PCB • IPM (Power transistor) module
H19	Indoor fan motor mechanism locked	7 occurrences continuously	-	• Indoor PCB • Fan motor
H23	Indoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	○	• Heat exchanger temperature sensor (defective or disconnected)
H27	Outdoor air temperature sensor abnormality	Continue for 5 sec.	○	• Outdoor temperature sensor (defective or disconnected)
H28	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	○	• Outdoor heat exchanger temperature sensor (defective or disconnected)
H30	Discharge temperature sensor abnormality	Continue for 5 sec.		• Outdoor discharge temperature sensor (defective or disconnected)
H33	Indoor / outdoor wrong connection	-	-	• Indoor / outdoor supply voltage
H38	Indoor / outdoor mismatch (brand code)	-	-	-
H64	Outdoor high pressure sensor abnormality	Continue for 1 minutes	-	• High pressure sensor • Lead wire and connector
H97	Outdoor fan lock abnormality	2 occurrences within 30 minutes		• Outdoor fan motor locked
H98	Indoor temperature rise abnormality	-	-	• Air filter dirty • Air circulation short circuit
H99	Indoor heat exchanger freeze prevention protection	-	-	• Insufficient refrigerant • Air filter dirty
F11	4 way valve switching failure *	4 occurrences within 30 minutes	-	• 4-way valve • v-coil
F17	Indoor standby units freezing abnormality	3 times happen within 40 minutes	-	• Check indoor/outdoor connection wire and pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve lead wire and connector.
F90	System and compressor microcomputer communication error(for S10*** only)	2 occurrences within 5 seconds	-	• Compressor • Outdoor PCB
F90	Power factor correction abnormality	4 occurrences within 20 minutes	-	• Outdoor PCB
F91	Refrigerant cycle abnormal	2 occurrences within 20 minutes	-	• No refrigerant (3-way valve is closed)
F93	Outdoor compressor abnormal revolution	4 occurrences within 20 minutes	-	• Outdoor compressor
F95	Cooling high pressure protection	4 occurrences within 20 minutes	-	• Outdoor refrigerant circuit
F96	Intelligent power transistor overheating protection	-	-	• Excess refrigerant • Improper heat radiation • IPM (Power transistor)
F97	Compressor temperature rise protection control	4 times occurrence within 20 minutes	-	• Insufficient refrigerant • Compressor
F98	Total running current protection	3 times occurrence within 20 minutes	-	• Excess refrigerant • Improper heat radiation
F99	Outdoor direct current (DC) peak detection	7 times occurrence continuously	-	• Outdoor PCB • IPM (Power transistor) • Compressor

Note:
"○" – Frequency measured and fan speed fixed
" * "– For cooling only model, it is the indication when indoor heat exchanger sensor or indoor air intake sensor has abnormality.

The memory data of error code is erased when the power supply is cut off, or press the Auto Switch until "beep" sound heard following by pressing the CHECK button at remote control.
Although operation forced to stop when abnormality detected, emergency operation is possible for certain errors (refer to Error Code Table) by using remote control or Auto OFF/ON button at indoor unit. However, the remote control signal receiving sound is changed from one "beep" to four "beep" sounds.

14.4 Troubleshooting Flowchart

14.4.1 H11 (Indoor/Outdoor Abnormal Communication)

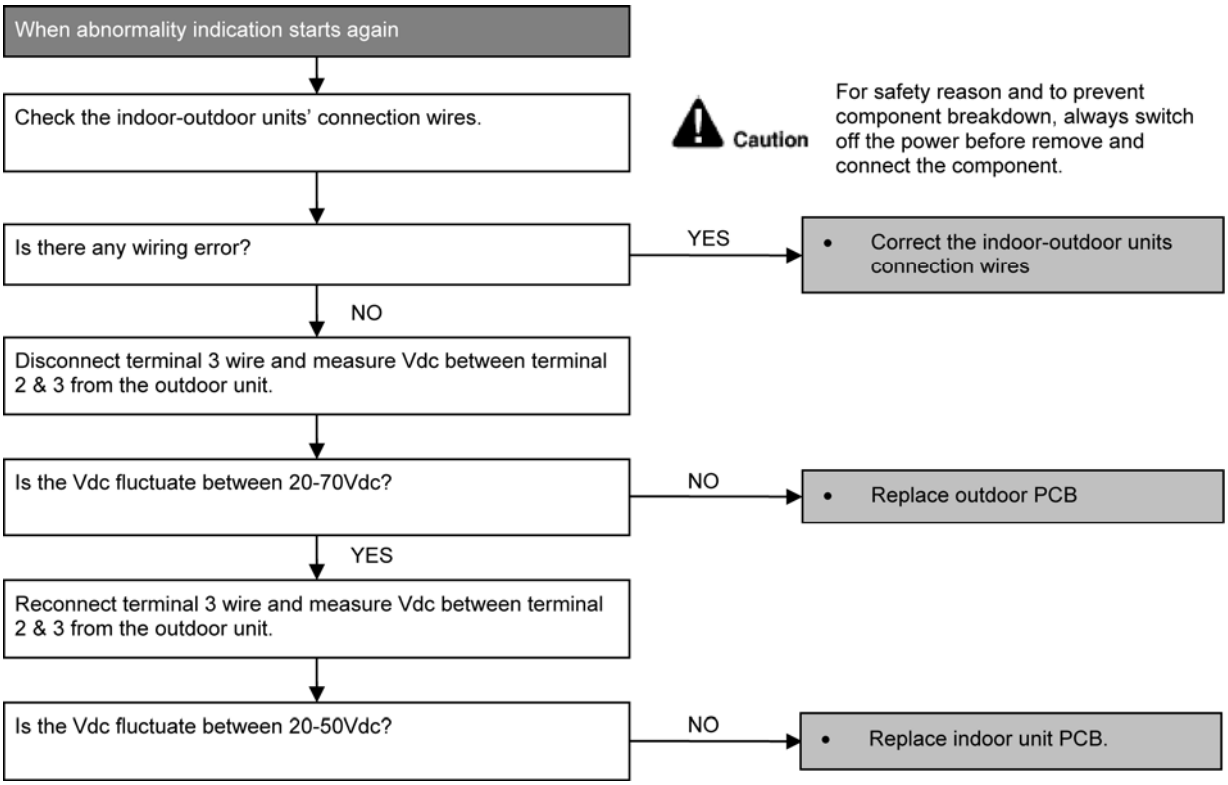
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

Malfunction Caused

- Faulty indoor unit PCB.
- Faulty outdoor unit PCB.
- Indoor unit-outdoor unit signal transmission error due to wrong wiring.
- Indoor unit-outdoor unit signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.
- Indoor unit-outdoor unit signal transmission error due to disturbed power supply waveform.

Troubleshooting


When abnormality indication starts again
Check the indoor-outdoor units' connection wires.
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is there any wiring error?
YES
Correct the indoor-outdoor units connection wires
NO
Disconnect terminal 3 wire and measure Vdc between terminal 2 & 3 from the outdoor unit.
Is the Vdc fluctuate between 20-70Vdc?
NO
Replace outdoor PCB
YES
Reconnect terminal 3 wire and measure Vdc between terminal 2 & 3 from the outdoor unit.
Is the Vdc fluctuate between 20-50Vdc?
NO
Replace indoor unit PCB.

14.4.2 H12 (Indoor/Outdoor Capacity Rank Mismatched)

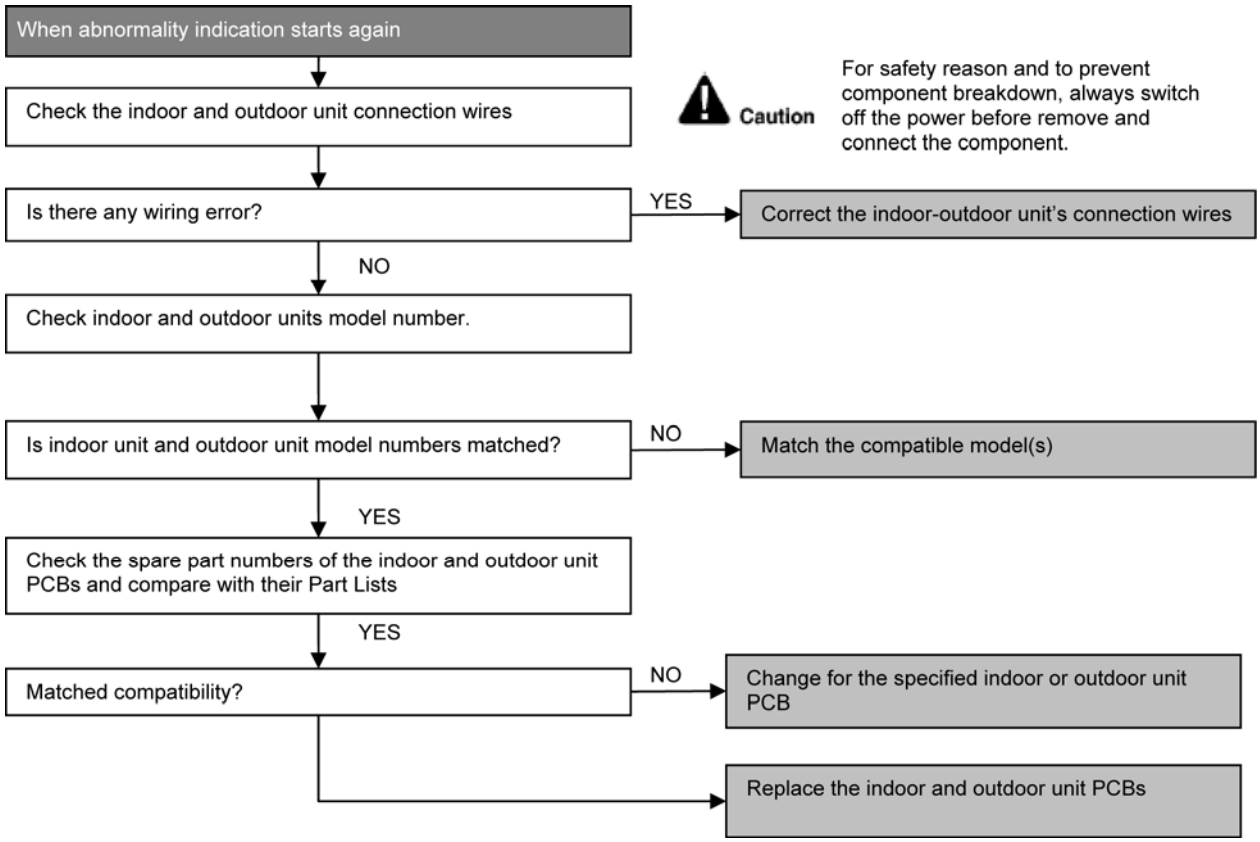
Malfunction Decision Conditions

- During startup, error code appears when different types of indoor and outdoor units are interconnected.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit or outdoor unit PCBs mounted.
- Indoor unit or outdoor unit PCBs defective.
- Indoor-outdoor unit signal transmission error due to wrong wiring.
- Indoor-outdoor unit signal transmission error due to breaking of wire 3 in the connection wires between the indoor and outdoor units.

Troubleshooting


When abnormality indication starts again
Check the indoor and outdoor unit connection wires
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is there any wiring error?
YES
Correct the indoor-outdoor unit's connection wires
NO
Check indoor and outdoor units model number.
Is indoor unit and outdoor unit model numbers matched?
NO
Match the compatible model(s)
YES
Check the spare part numbers of the indoor and outdoor unit PCBs and compare with their Part Lists
YES
Matched compatibility?
NO
Change for the specified indoor or outdoor unit PCB
Replace the indoor and outdoor unit PCBs

14.4.3 H14 (Indoor Intake Air Temperature Sensor Abnormality)

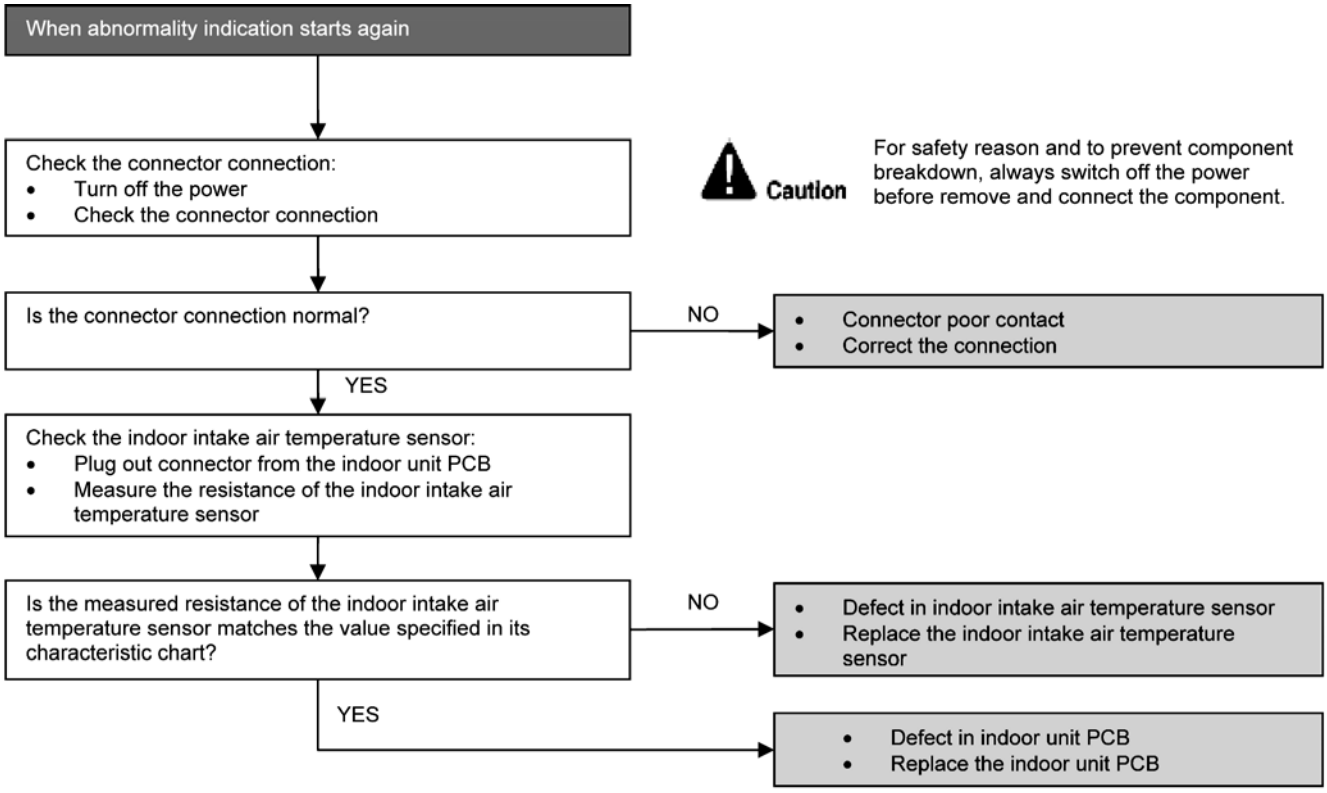
Malfunction Decision Conditions

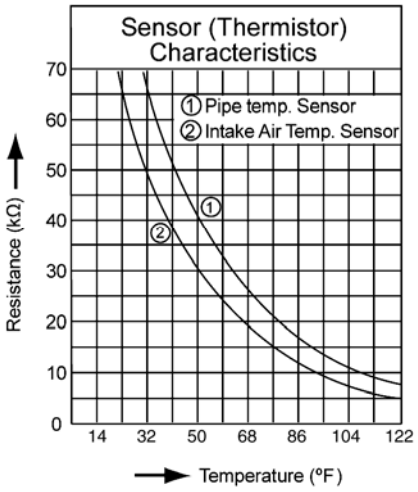
- During startup and operation of cooling and heating, the temperatures detected by the indoor intake air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the indoor intake air temperature sensor:
• Plug out connector from the indoor unit PCB
• Measure the resistance of the indoor intake air temperature sensor
Is the measured resistance of the indoor intake air temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in indoor intake air temperature sensor
• Replace the indoor intake air temperature sensor
YES
• Defect in indoor unit PCB
• Replace the indoor unit PCB



14.4.4 H15 (Compressor Temperature Sensor Abnormality)

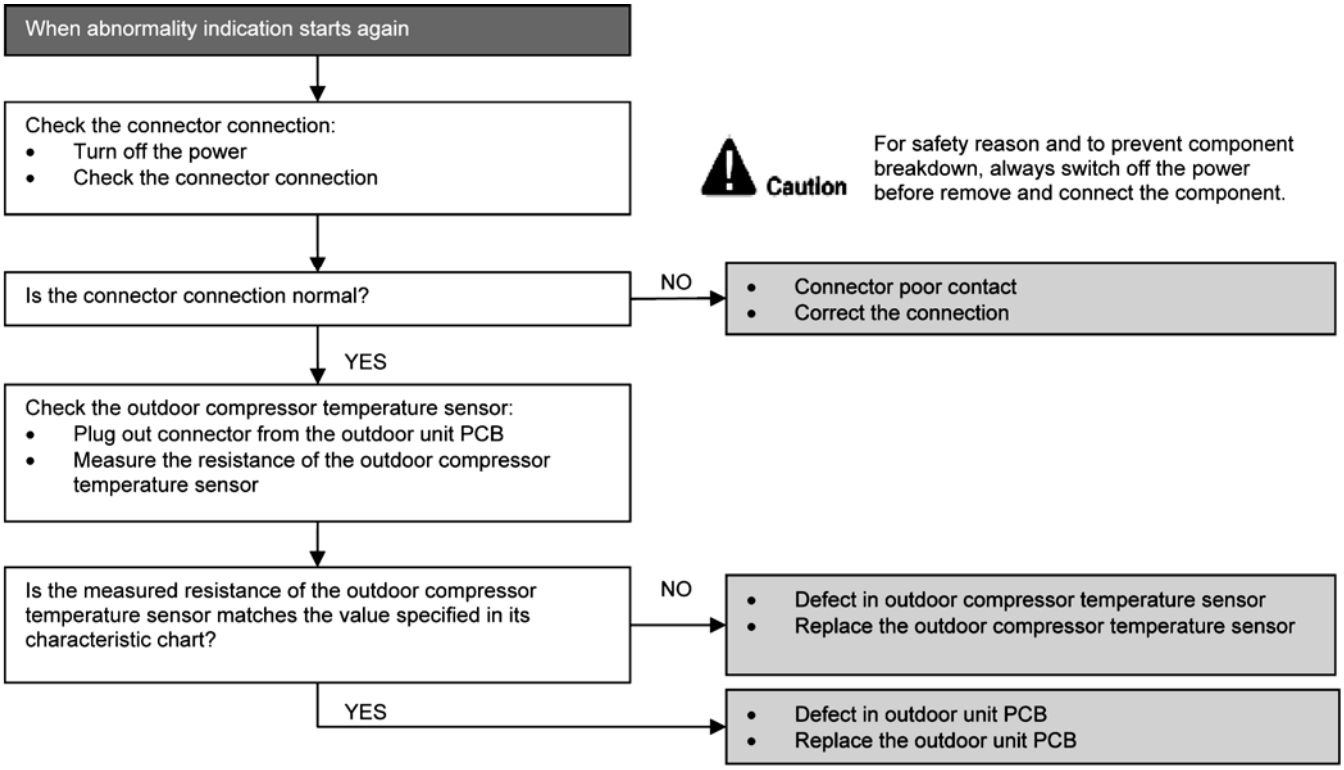
Malfunction Decision Conditions

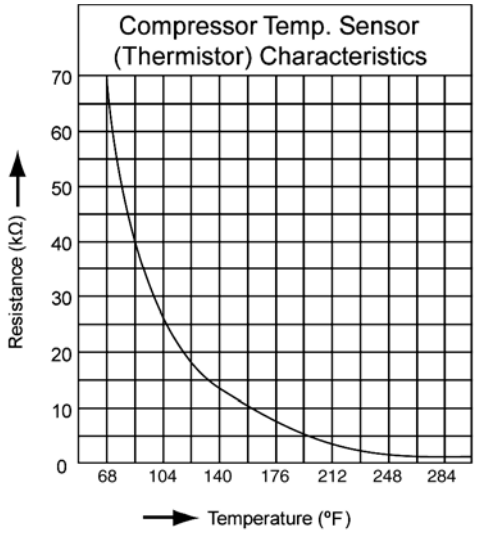
- During startup and operation of cooling and heating, the temperatures detected by the outdoor compressor temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the outdoor compressor temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor compressor temperature sensor
Is the measured resistance of the outdoor compressor temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in outdoor compressor temperature sensor
• Replace the outdoor compressor temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB



14.4.5 H16 (Outdoor Current Transformer Open Circuit)

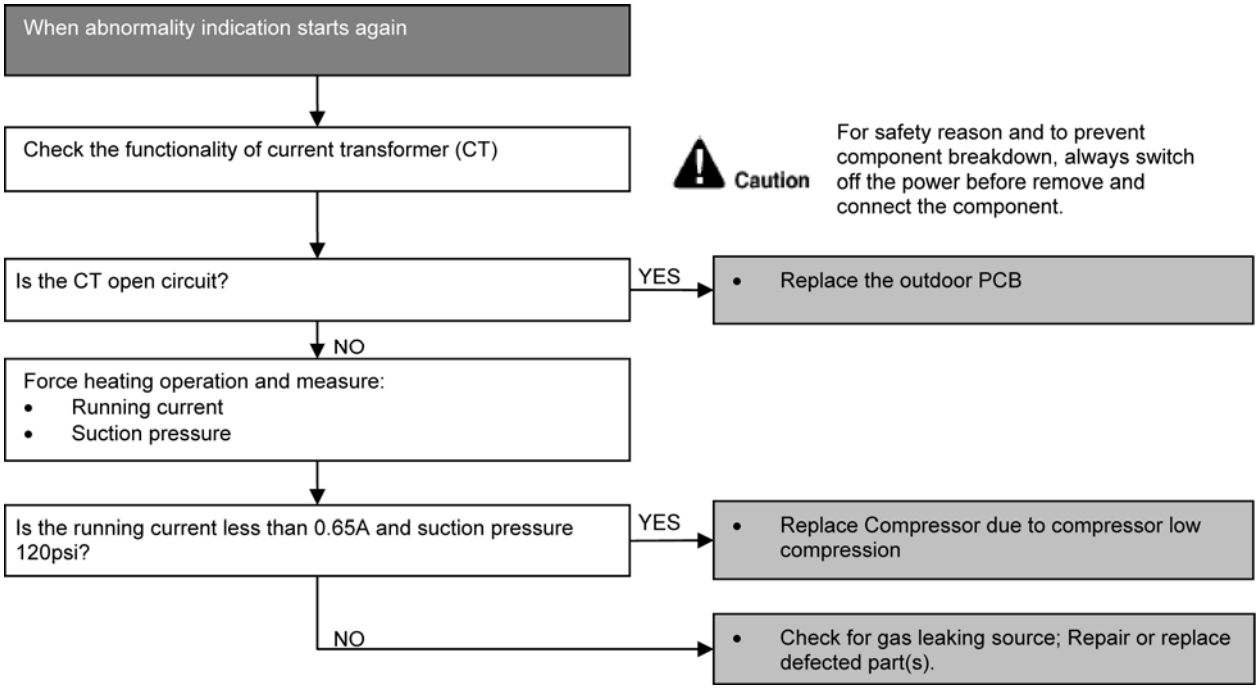
Malfunction Decision Conditions

- A current transformer (CT) is detected by checking the compressor running frequency (≥ rated frequency) and CT detected input current (less than 1.14A) for continuously 20 seconds.

Malfunction Caused

- CT defective
- Outdoor PCB defective
- Compressor defective (low compression)

Troubleshooting


When abnormality indication starts again
Check the functionality of current transformer (CT)
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the CT open circuit?
YES
Replace the outdoor PCB
NO
Force heating operation and measure:
Running current
Suction pressure
Is the running current less than 0.65A and suction pressure 120psi?
YES
Replace Compressor due to compressor low compression
NO
Check for gas leaking source; Repair or replace defected part(s).

14.4.6 H19 (Indoor Fan Motor – DC Motor Mechanism Locked)

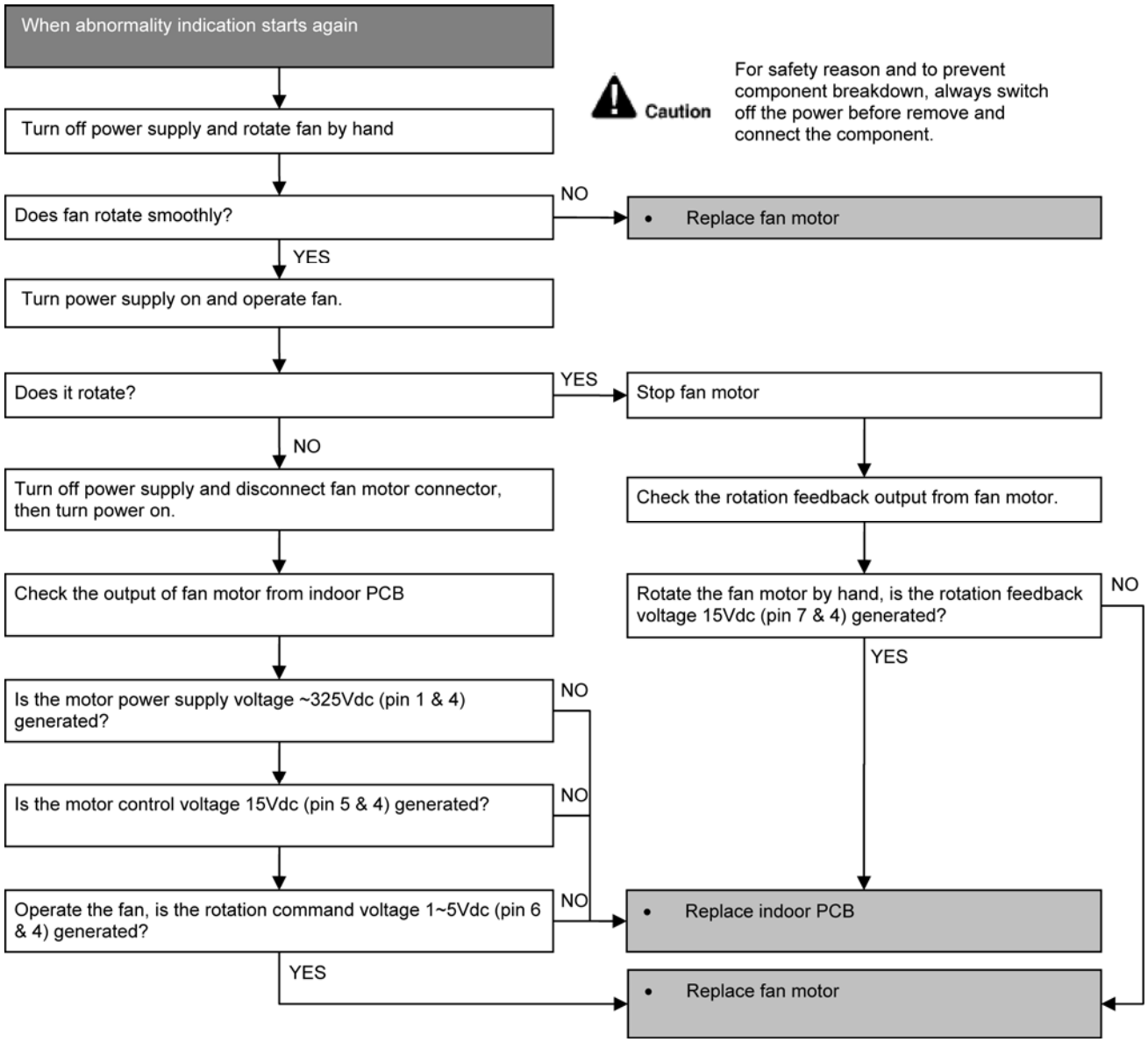
Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor (feedback of rotation > 2550rpm or < 50rpm)

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty indoor unit PCB.

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Turn off power supply and rotate fan by hand
Does fan rotate smoothly?
NO
Replace fan motor
YES
Turn power supply on and operate fan.
Does it rotate?
YES
Stop fan motor
NO
Turn off power supply and disconnect fan motor connector, then turn power on.
Check the rotation feedback output from fan motor.
Check the output of fan motor from indoor PCB
Rotate the fan motor by hand, is the rotation feedback voltage 15Vdc (pin 7 & 4) generated?
NO
YES
Is the motor power supply voltage ~325Vdc (pin 1 & 4) generated?
NO
Is the motor control voltage 15Vdc (pin 5 & 4) generated?
NO
Operate the fan, is the rotation command voltage 1~5Vdc (pin 6 & 4) generated?
NO
Replace indoor PCB
YES
Replace fan motor

14.4.7 H23 (Indoor Pipe Temperature Sensor Abnormality)

Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the indoor heat exchanger temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting

When abnormality indication starts again

Check the connector connection:
- Plug out connector from the indoor unit PCB
- Measure the resistance of the indoor pipe temperature sensor

Caution For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

Is the connector connection normal?

NO
- Connector poor contact
- Correct the connection

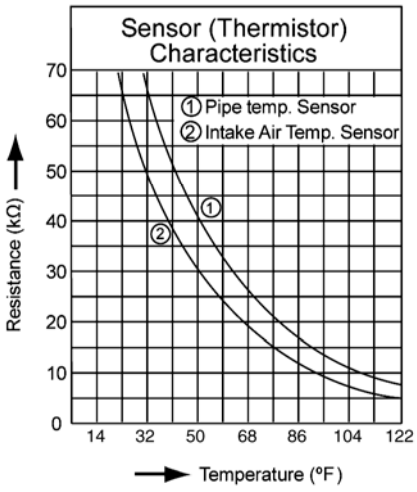
YES

Check the outdoor air temperature sensor:
- Plug out connector from the outdoor unit PCB
- Measure the resistance of the outdoor intake air temperature sensor

Is the measured resistance of the outdoor intake air temperature sensor matches the value specified in its characteristic chart?

NO
- Defect in outdoor intake air temperature sensor
- Replace the outdoor intake air temperature sensor

YES
- Detect in outdoor unit PCB
- Replace the outdoor unit PCB



14.4.8 H27 (Outdoor Air Temperature Sensor Abnormality)

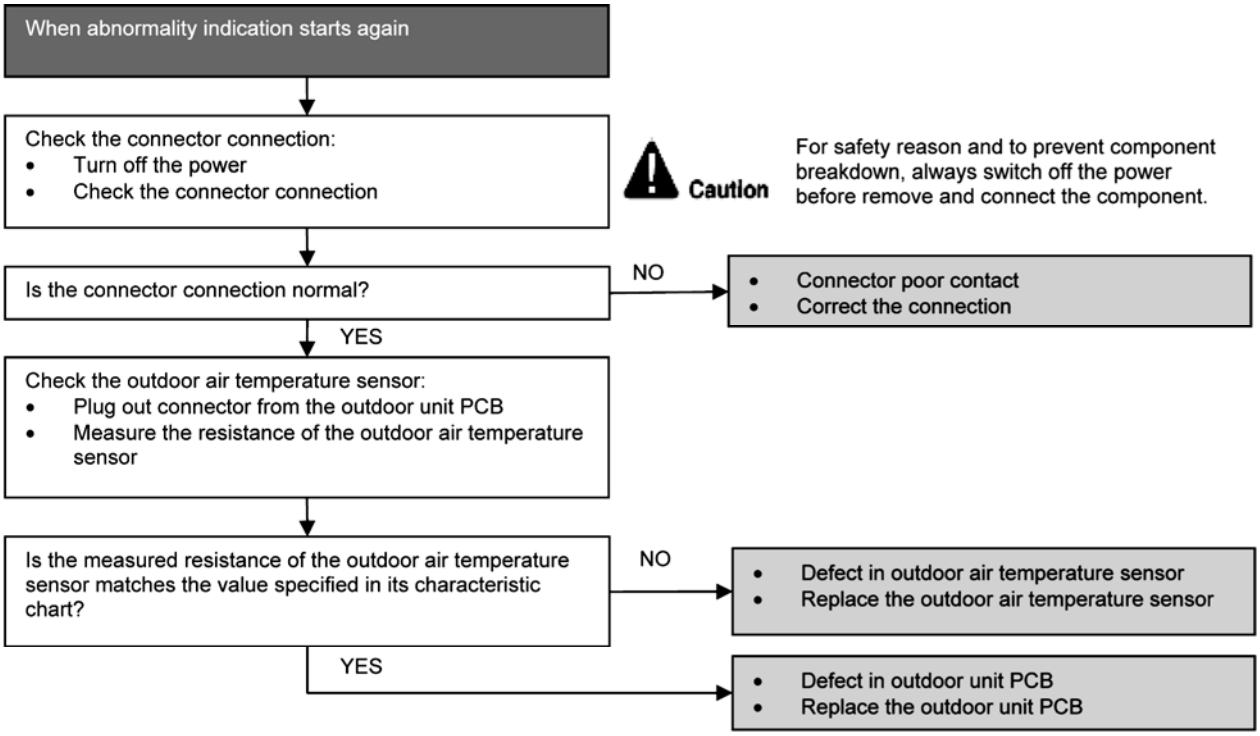
Malfunction Decision Conditions

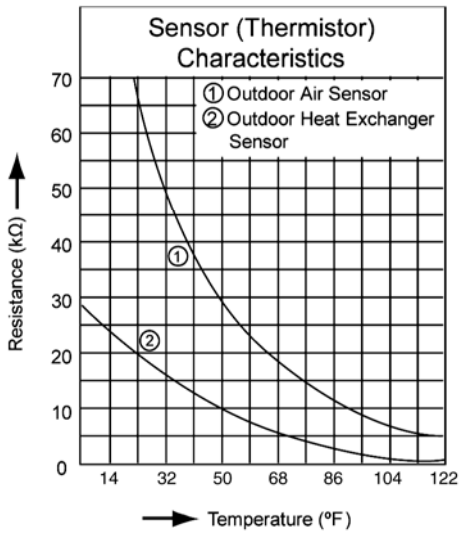
- During startup and operation of cooling and heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the outdoor air temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor air temperature sensor
Is the measured resistance of the outdoor air temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in outdoor air temperature sensor
• Replace the outdoor air temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB



14.4.9 H28 (Outdoor Pipe Temperature Sensor Abnormality)

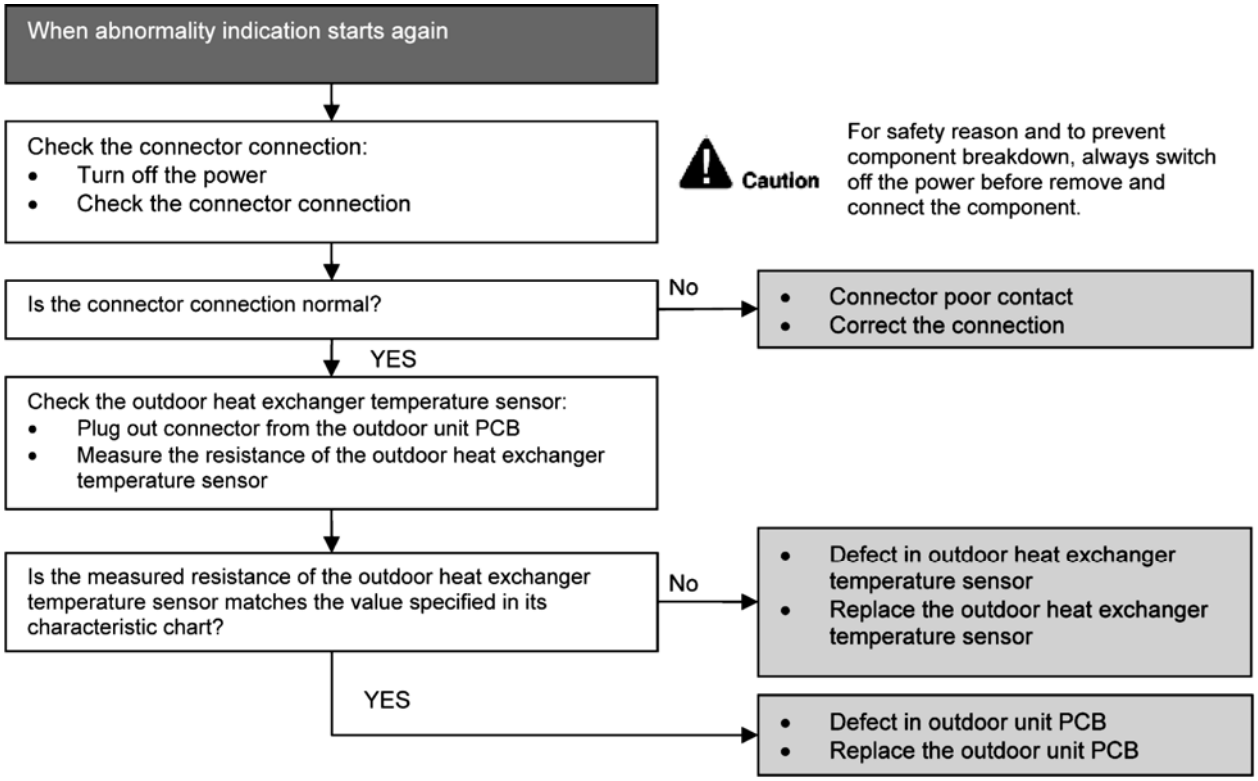
Malfunction Decision Conditions

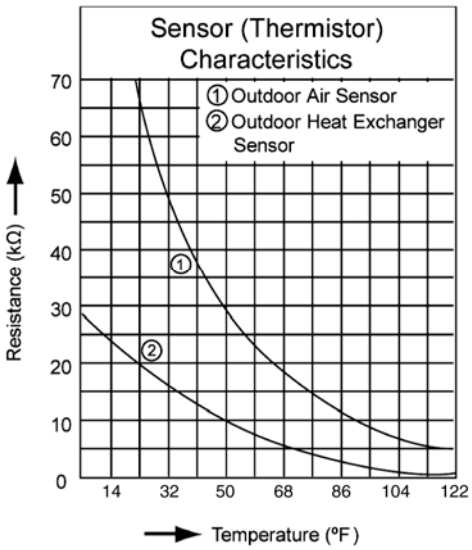
- During startup and operation of cooling and heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
No
• Connector poor contact
• Correct the connection
YES
Check the outdoor heat exchanger temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor heat exchanger temperature sensor
Is the measured resistance of the outdoor heat exchanger temperature sensor matches the value specified in its characteristic chart?
No
• Defect in outdoor heat exchanger temperature sensor
• Replace the outdoor heat exchanger temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB



14.4.10 H30 (Compressor Discharge Temperature Sensor Abnormality)

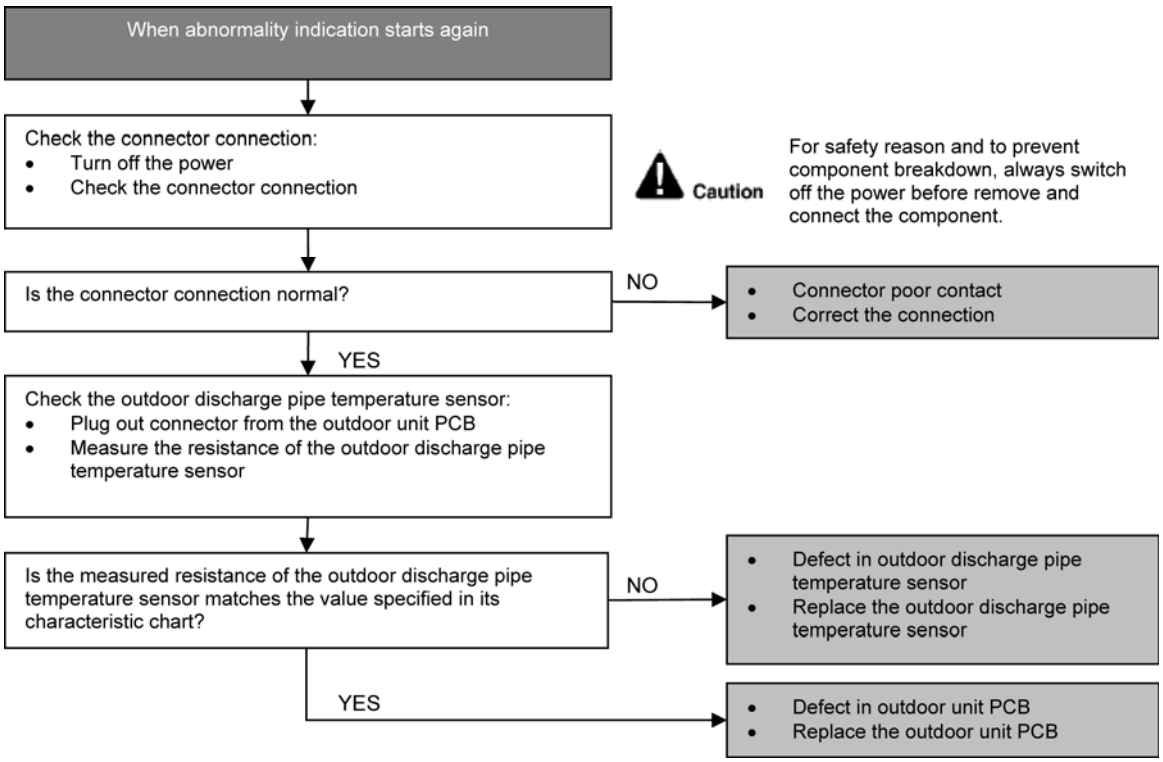
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor discharge pipe temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in outdoor discharge pipe temperature sensor
• Replace the outdoor discharge pipe temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB

14.4.11 H33 (Unspecified Voltage between Indoor and Outdoor)

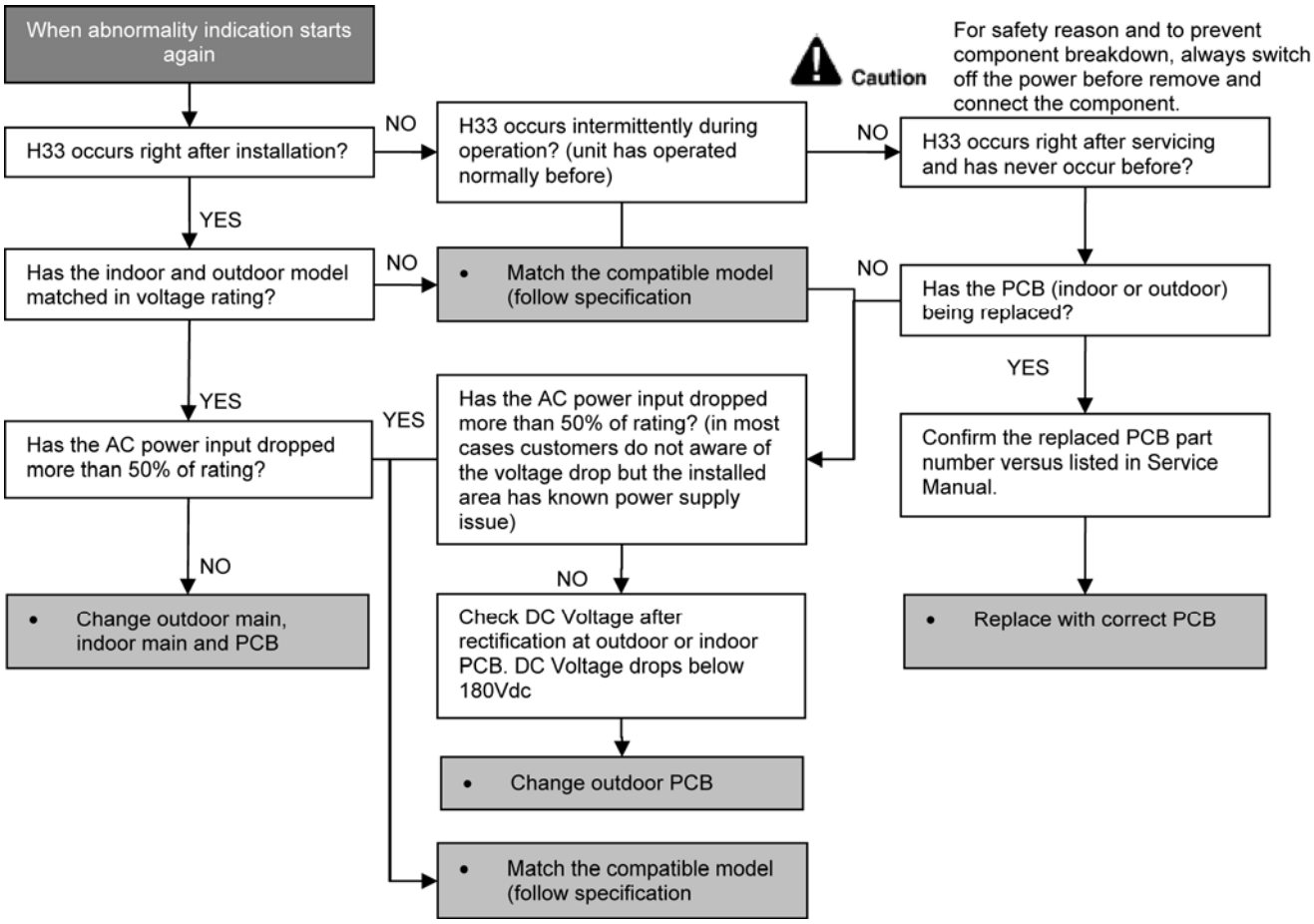
Malfunction Decision Conditions

- The supply power is detected for its requirement by the indoor/outdoor transmission.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit and outdoor unit PCBs used.
- Indoor unit or outdoor unit PCB defective.

Troubleshooting


When abnormality indication starts again
H33 occurs right after installation?
NO
H33 occurs intermittently during operation? (unit has operated normally before)
NO
H33 occurs right after servicing and has never occur before?
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
YES
Has the indoor and outdoor model matched in voltage rating?
NO
• Match the compatible model (follow specification
NO
Has the PCB (indoor or outdoor) being replaced?
YES
YES
Has the AC power input dropped more than 50% of rating?
YES
Has the AC power input dropped more than 50% of rating? (in most cases customers do not aware of the voltage drop but the installed area has known power supply issue)
Confirm the replaced PCB part number versus listed in Service Manual.
NO
• Change outdoor main, indoor main and PCB
NO
Check DC Voltage after rectification at outdoor or indoor PCB. DC Voltage drops below 180Vdc
• Replace with correct PCB
• Change outdoor PCB
• Match the compatible model (follow specification

14.4.12 H97 (Outdoor Fan Motor – DC Motor Mechanism Locked)

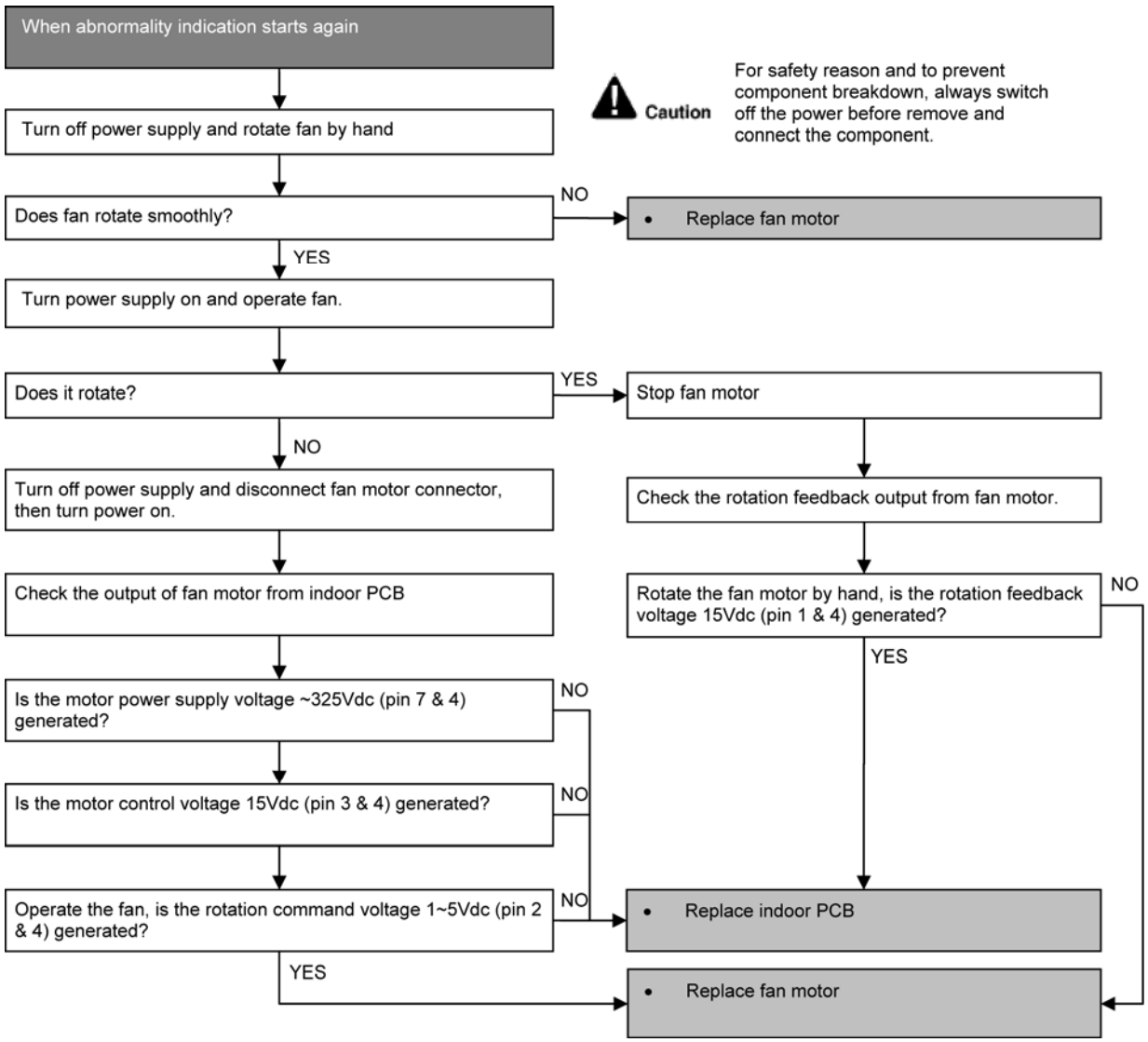
Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor.

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty outdoor unit PCB.

Troubleshooting


When abnormality indication starts again
Turn off power supply and rotate fan by hand
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Does fan rotate smoothly?
NO
Replace fan motor
YES
Turn power supply on and operate fan.
Does it rotate?
YES
Stop fan motor
NO
Turn off power supply and disconnect fan motor connector, then turn power on.
Check the rotation feedback output from fan motor.
Check the output of fan motor from indoor PCB
Rotate the fan motor by hand, is the rotation feedback voltage 15Vdc (pin 1 & 4) generated?
NO
YES
Is the motor power supply voltage ~325Vdc (pin 7 & 4) generated?
NO
Is the motor control voltage 15Vdc (pin 3 & 4) generated?
NO
Operate the fan, is the rotation command voltage 1~5Vdc (pin 2 & 4) generated?
NO
Replace indoor PCB
YES
Replace fan motor

14.4.13 H98 (Indoor High Pressure Protection)

Error Code will not display (no Timer LED blinking) but store in EEPROM

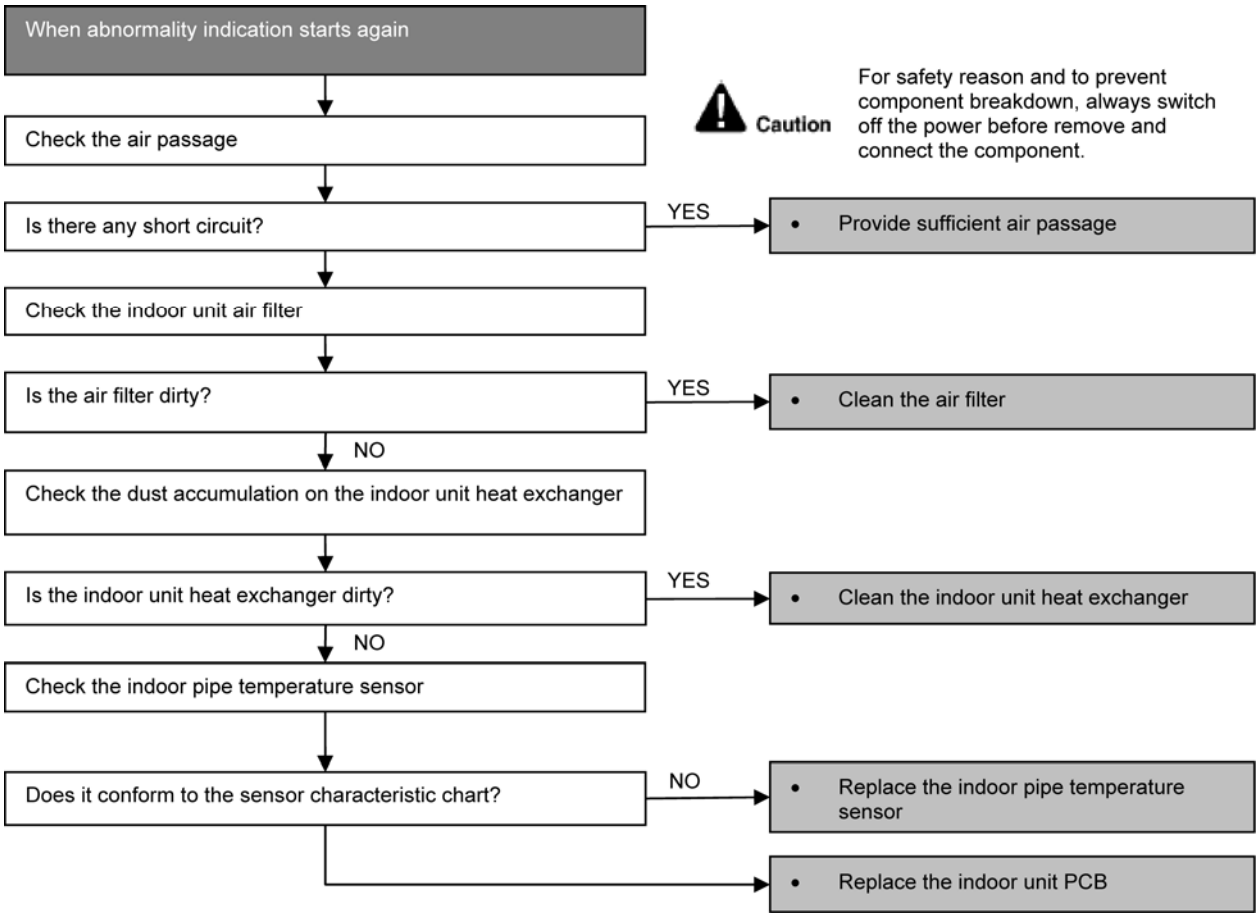
Malfunction Decision Conditions

- During heating operation, the temperature detected by the indoor pipe temperature sensor is above 140°F.

Malfunction Caused

- Clogged air filter of the indoor unit
- Dust accumulation on the indoor unit heat exchanger
- Air short circuit
- Detection error due to faulty indoor pipe temperature sensor
- Detection error due to faulty indoor unit PCB

Troubleshooting


When abnormality indication starts again
Check the air passage
Is there any short circuit?
YES
• Provide sufficient air passage
Check the indoor unit air filter
Is the air filter dirty?
YES
• Clean the air filter
NO
Check the dust accumulation on the indoor unit heat exchanger
Is the indoor unit heat exchanger dirty?
YES
• Clean the indoor unit heat exchanger
NO
Check the indoor pipe temperature sensor
Does it conform to the sensor characteristic chart?
NO
• Replace the indoor pipe temperature sensor
• Replace the indoor unit PCB
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

14.4.14 H99 (Indoor Freeze Prevention Protection: Cooling or Soft Dry)

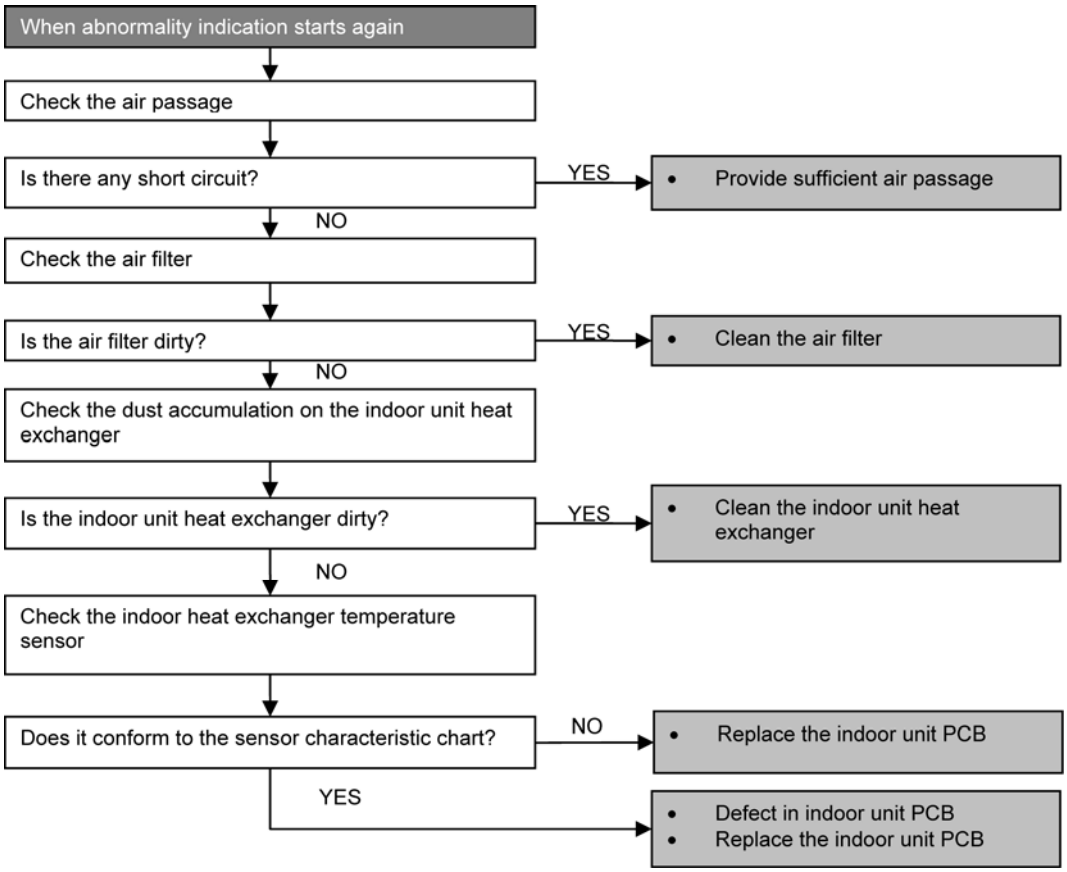
Malfunction Decision Conditions

- Freeze prevention control takes place (when indoor pipe temperature is lower than 35.6°F)

Malfunction Caused

- Clogged air filter of the indoor unit
- Dust accumulation on the indoor unit heat exchanger
- Air short circuit
- Detection error due to faulty indoor pipe temperature sensor
- Detection error due to faulty indoor unit PCB

Troubleshooting


When abnormality indication starts again
Check the air passage
Is there any short circuit?
YES
• Provide sufficient air passage
NO
Check the air filter
Is the air filter dirty?
YES
• Clean the air filter
NO
Check the dust accumulation on the indoor unit heat exchanger
Is the indoor unit heat exchanger dirty?
YES
• Clean the indoor unit heat exchanger
NO
Check the indoor heat exchanger temperature sensor
Does it conform to the sensor characteristic chart?
NO
• Replace the indoor unit PCB
YES
• Defect in indoor unit PCB
• Replace the indoor unit PCB

14.4.15 F11 (Indoor Pipe Temperature Sensor Abnormality)

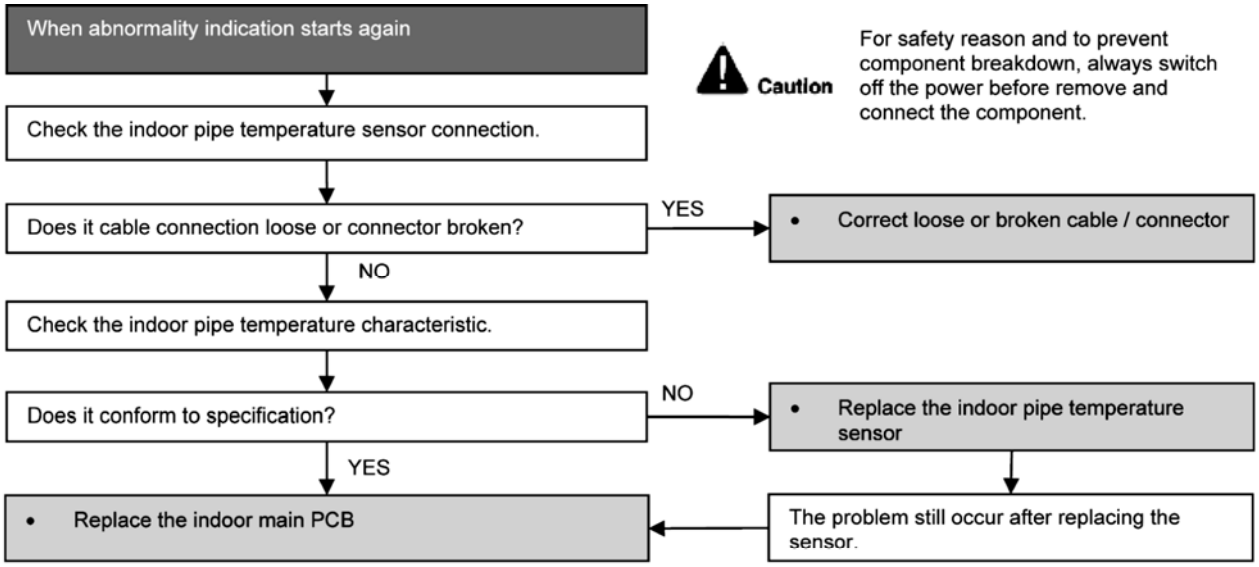
Malfunction Decision Conditions

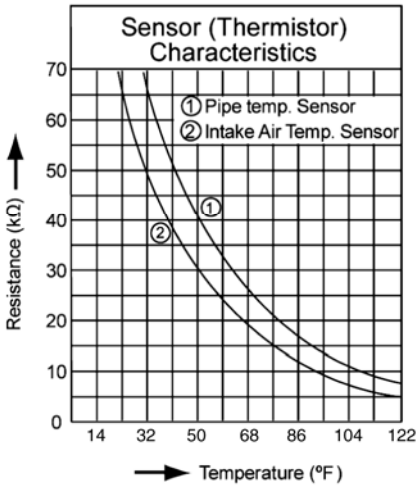
- When cooling operation, when indoor pipe temperature or indoor heat exchanger temperature sensor is above 113°F.

Malfunction Caused

- Faulty connector connection.
- Faulty indoor pipe temperature sensor.
- Faulty indoor main PCB.

Troubleshooting


When abnormality indication starts again
Check the indoor pipe temperature sensor connection.
Does it cable connection loose or connector broken?
YES
• Correct loose or broken cable / connector
NO
Check the indoor pipe temperature characteristic.
Does it conform to specification?
NO
• Replace the indoor pipe temperature sensor
YES
• Replace the indoor main PCB
The problem still occur after replacing the sensor.
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



14.4.16 F90 (Power Factor Correction Protection)

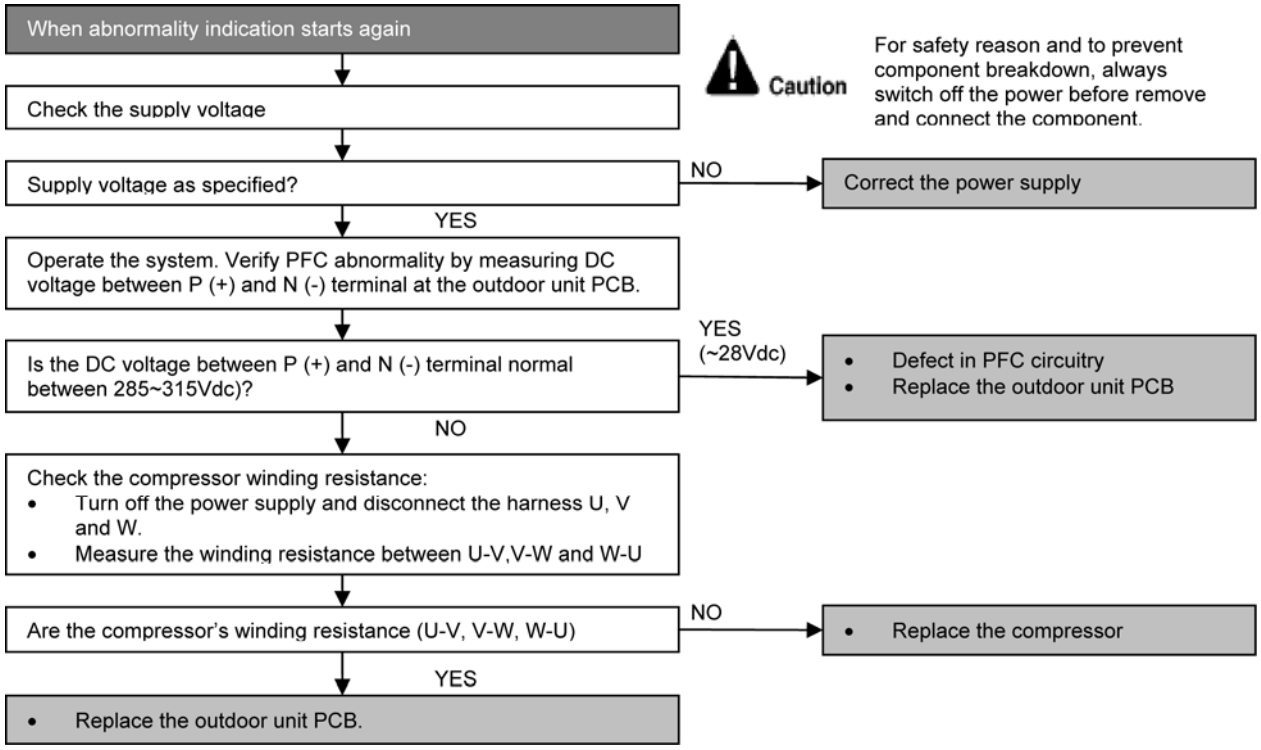
Malfunction Decision Conditions

- During startup and operation of cooling and heating, when Power Factor Correction (PFC) protection circuitry at the outdoor unit main PCB senses abnormal high DC voltage level.

Malfunction Caused

- DC voltage peak due to power supply surge.
- DC voltage peak due to compressor windings not uniform.
- Faulty outdoor PCB.

Troubleshooting


When abnormality indication starts again
Check the supply voltage
Supply voltage as specified?
NO
Correct the power supply
YES
Operate the system. Verify PFC abnormality by measuring DC voltage between P (+) and N (-) terminal at the outdoor unit PCB.
Is the DC voltage between P (+) and N (-) terminal normal between 285~315Vdc)?
YES (~28Vdc)
Defect in PFC circuitry
Replace the outdoor unit PCB
NO
Check the compressor winding resistance:
Turn off the power supply and disconnect the harness U, V and W.
Measure the winding resistance between U-V,V-W and W-U
Are the compressor's winding resistance (U-V, V-W, W-U)
NO
Replace the compressor
YES
Replace the outdoor unit PCB.
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

14.4.17 F91 (Refrigeration Cycle Abnormality)

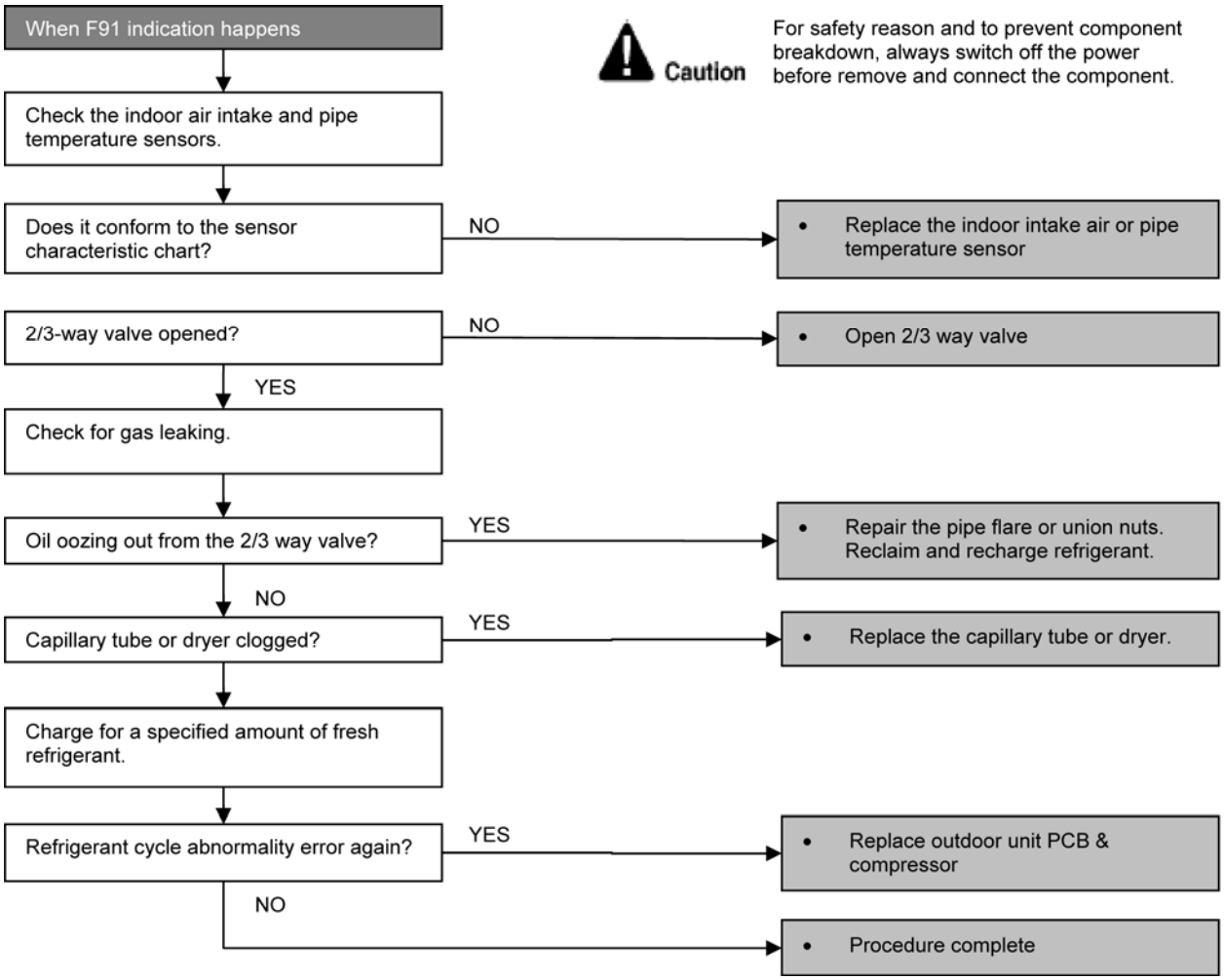
Malfunction Decision Conditions

- During cooling, compressor frequency = Fcmax.
- During cooling and heating operation, running current: 0.65A < I < 1.65A.
- During cooling, indoor intake - indoor pipe < 39.2°F.

Malfunction Caused

- Refrigerant shortage (refrigerant leakage)
- Poor compression performance of compressor.
- 2/3 way valve closed.
- Detection error due to faulty indoor intake air or indoor pipe temperature sensors.

Troubleshooting


When F91 indication happens
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Check the indoor air intake and pipe temperature sensors.
Does it conform to the sensor characteristic chart?
NO
Replace the indoor intake air or pipe temperature sensor
2/3-way valve opened?
NO
Open 2/3 way valve
YES
Check for gas leaking.
Oil oozing out from the 2/3 way valve?
YES
Repair the pipe flare or union nuts. Reclaim and recharge refrigerant.
NO
Capillary tube or dryer clogged?
YES
Replace the capillary tube or dryer.
Charge for a specified amount of fresh refrigerant.
Refrigerant cycle abnormality error again?
YES
Replace outdoor unit PCB & compressor
NO
Procedure complete

14.4.18 F93 (Compressor Rotation Failure)

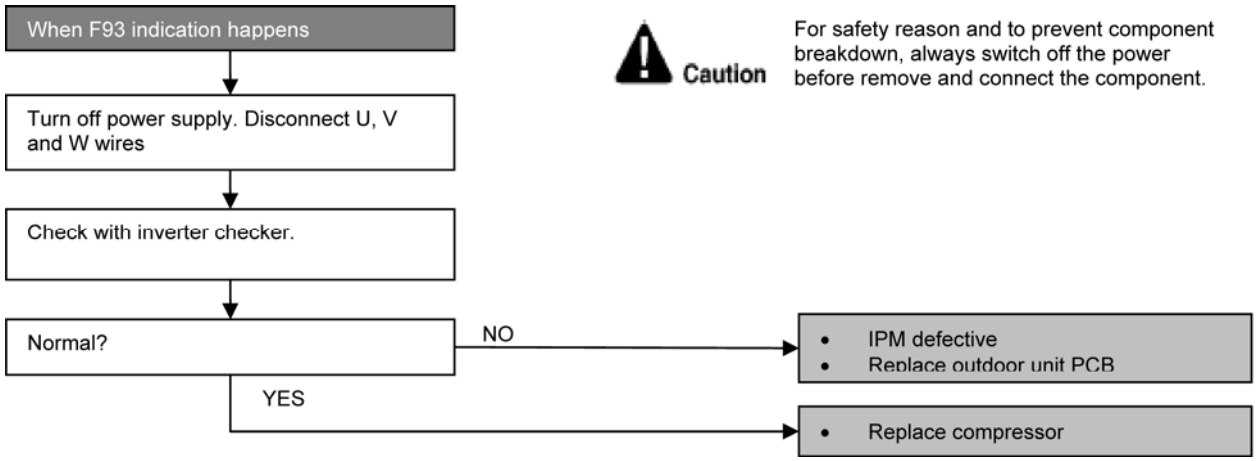
Malfunction Decision Conditions

A compressor rotation failure is detected by checking the compressor running condition through the position detection circuit.

Malfunction Caused

- Compressor terminal disconnect
- Outdoor PCB malfunction

Troubleshooting


When F93 indication happens
Turn off power supply. Disconnect U, V and W wires
Check with inverter checker.
Normal?
NO
YES
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
IPM defective
Replace outdoor unit PCB
Replace compressor

14.4.19 F95 (Cooling High Pressure Abnormality)

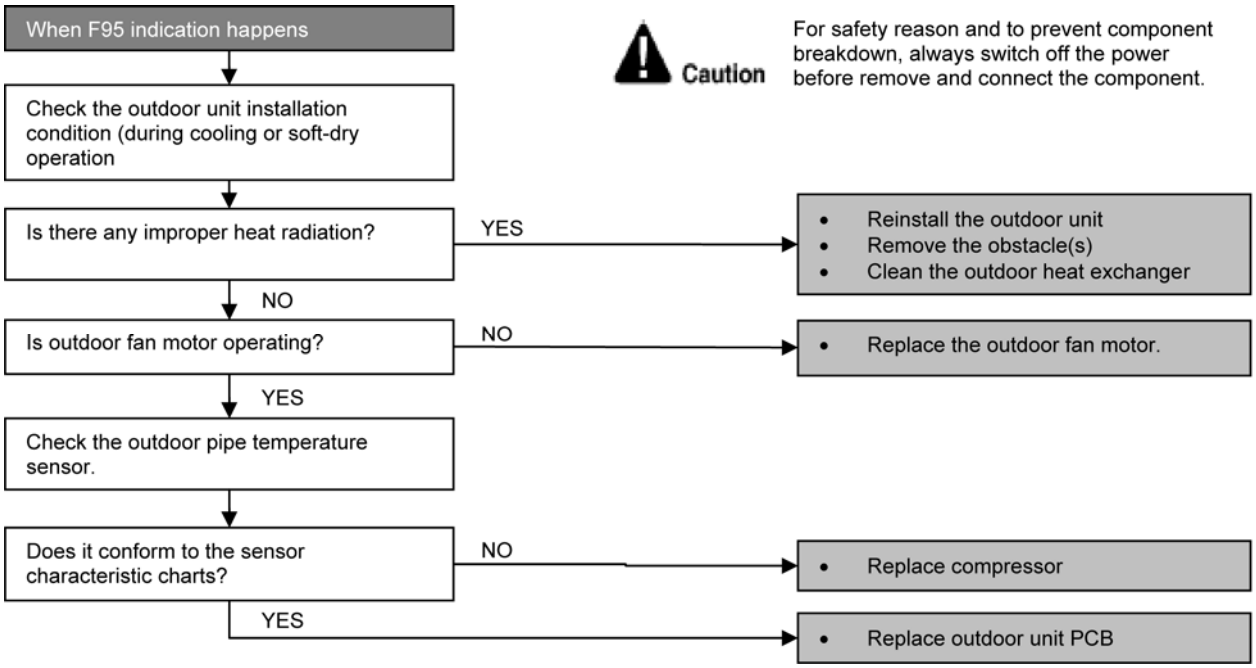
Malfunction Decision Conditions

During operation of cooling, when outdoor unit heat exchanger high temperature data (141.8°F) is detected by the outdoor pipe temperature sensor.

Malfunction Caused

- Outdoor pipe temperature rise due to short circuit of hot discharge air flow.
- Outdoor pipe temperature rise due to defective of outdoor fan motor.
- Outdoor pipe temperature rise due to defective outdoor pipe temperature sensor.
- Outdoor pipe temperature rise due to defective outdoor unit PCB.

Troubleshooting


When F95 indication happens
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Check the outdoor unit installation condition (during cooling or soft-dry operation
Is there any improper heat radiation?
YES
Reinstall the outdoor unit
Remove the obstacle(s)
Clean the outdoor heat exchanger
NO
Is outdoor fan motor operating?
NO
Replace the outdoor fan motor.
YES
Check the outdoor pipe temperature sensor.
Does it conform to the sensor characteristic charts?
NO
Replace compressor
YES
Replace outdoor unit PCB

14.4.20 F96 (IPM Overheating)

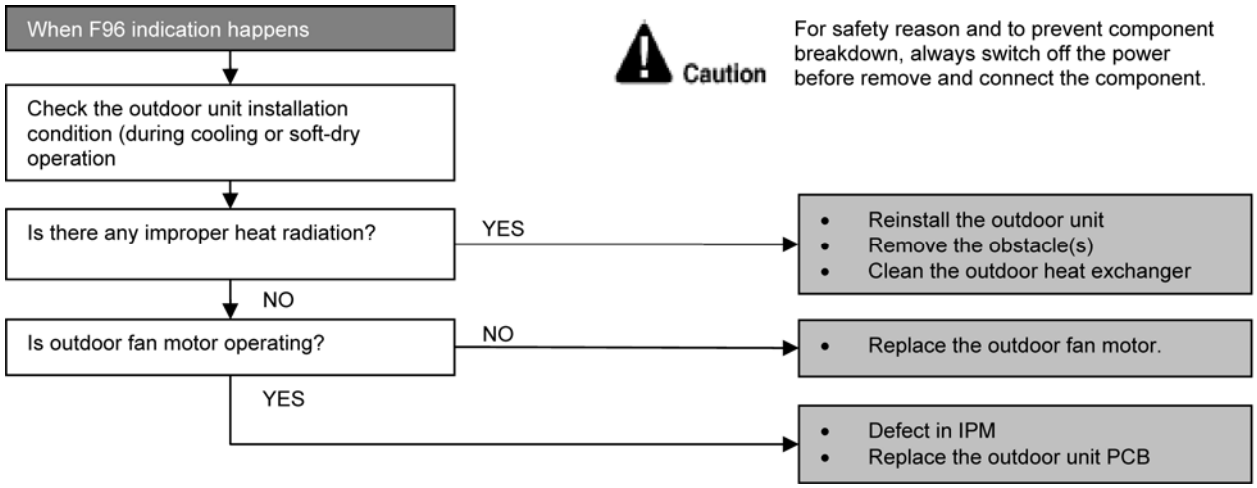
Malfunction Decision Conditions

During operating of cooling and heating, when IPM temperature data (212°F) is detected by the IPM temperature sensor.

Malfunction Caused

- IPM overheats due to short circuit of hot discharge air flow.
- IPM overheats due to defective of outdoor fan motor.
- IPM overheats due to defective of internal circuitry of IPM.
- IPM overheats due to defective IPM temperature sensor.

Troubleshooting


When F96 indication happens
Check the outdoor unit installation condition (during cooling or soft-dry operation
Is there any improper heat radiation?
YES
Reinstall the outdoor unit
Remove the obstacle(s)
Clean the outdoor heat exchanger
NO
Is outdoor fan motor operating?
NO
Replace the outdoor fan motor.
YES
Defect in IPM
Replace the outdoor unit PCB
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

14.4.21 F97 (Compressor Overheating)

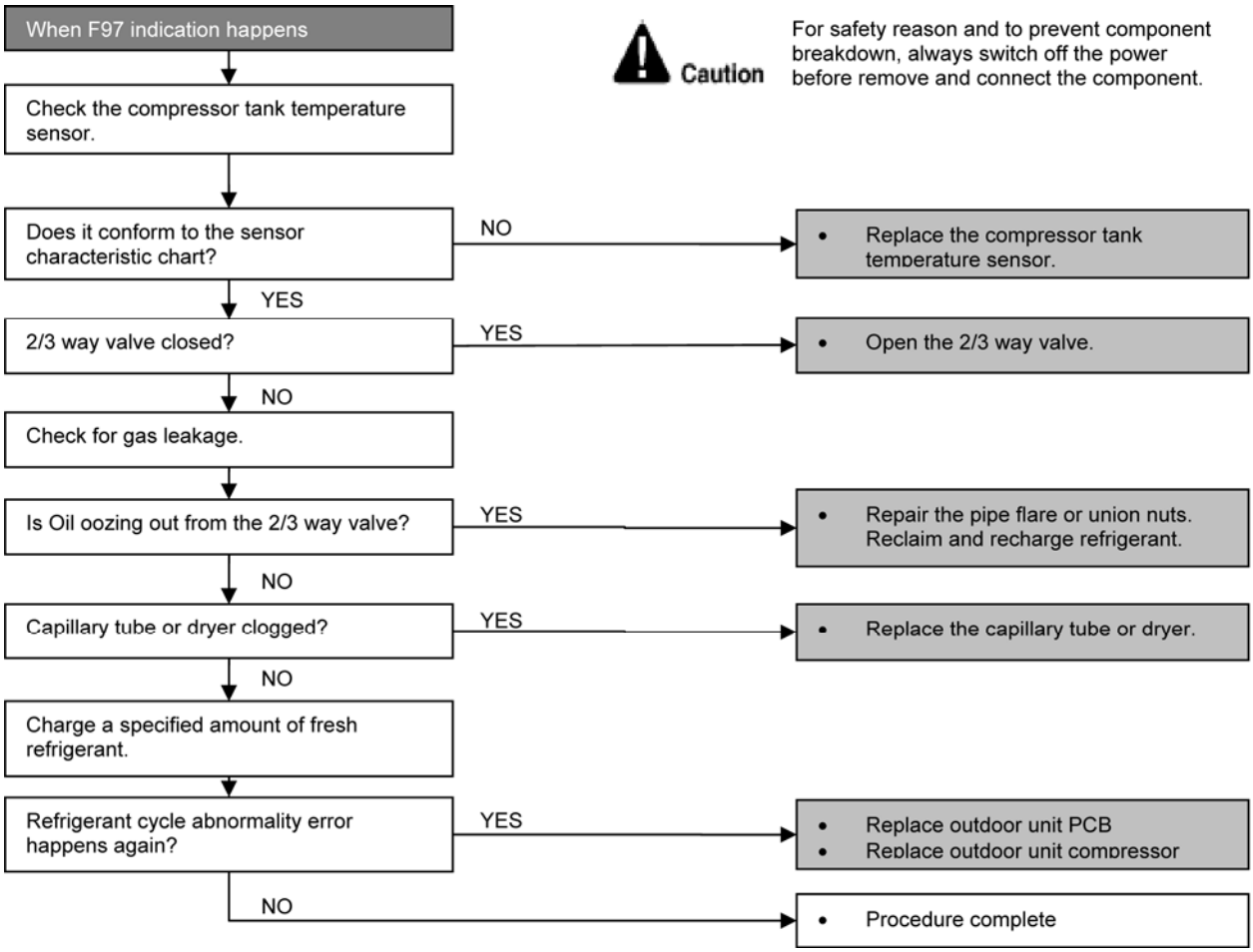
Malfunction Decision Conditions

During operation of cooling and heating, when compressor tank temperature data (233.6°F) is detected by the compressor tank temperature sensor.

Malfunction Caused

- Refrigerant shortage (refrigerant leakage).
- 2/3 way valve closed.
- Detection error due to faulty compressor tank temperature sensor.

Troubleshooting


When F97 indication happens
Check the compressor tank temperature sensor.
Does it conform to the sensor characteristic chart?
NO
Replace the compressor tank temperature sensor.
YES
2/3 way valve closed?
YES
Open the 2/3 way valve.
NO
Check for gas leakage.
Is Oil oozing out from the 2/3 way valve?
YES
Repair the pipe flare or union nuts. Reclaim and recharge refrigerant.
NO
Capillary tube or dryer clogged?
YES
Replace the capillary tube or dryer.
NO
Charge a specified amount of fresh refrigerant.
Refrigerant cycle abnormality error happens again?
YES
Replace outdoor unit PCB
Replace outdoor unit compressor
NO
Procedure complete
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

14.4.22 F98 (Input Over Current Detection)

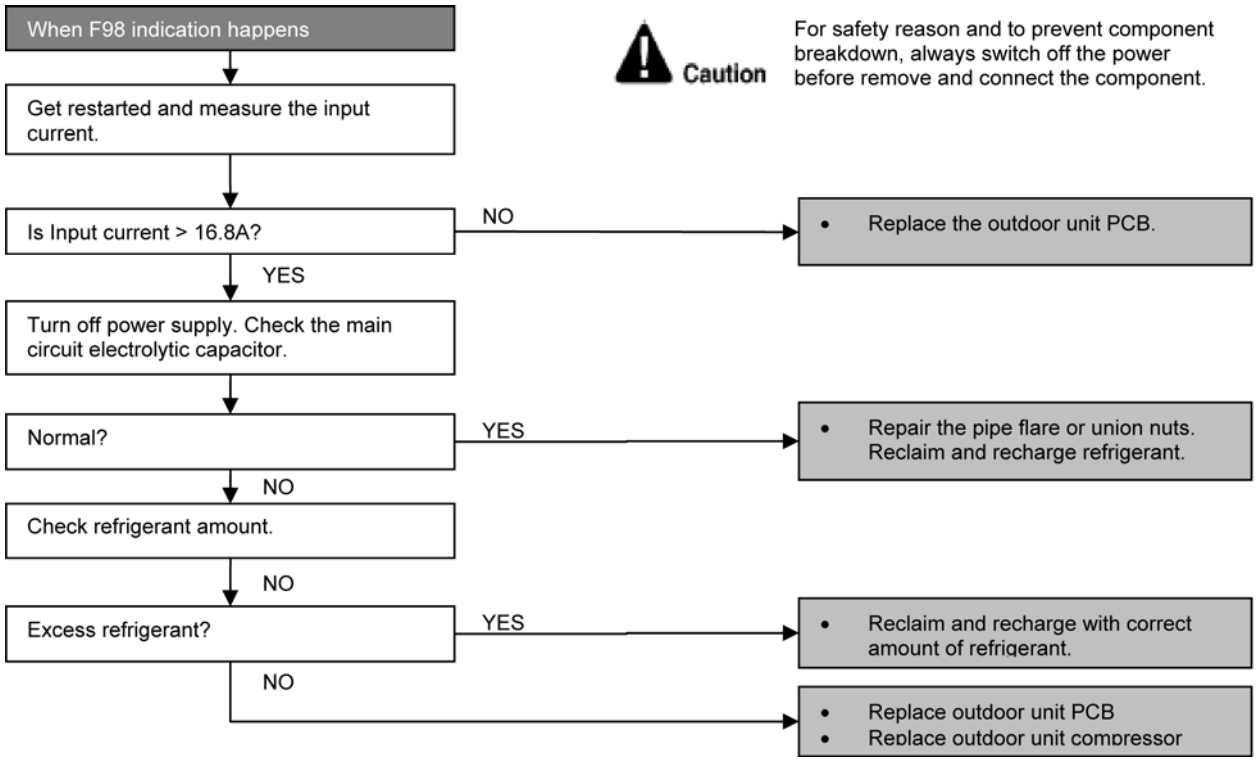
Malfunction Decision Conditions

During cooling and heating operation, when an input over-current (16.8A) is detected by checking the input current value being detected by current transformer (CT) with the compressor running.

Malfunction Caused

- Over-current due to compressor failure.
- Over-current due to defective outdoor unit PCB.
- Over-current due to defective inverter main circuit electrolytic capacitor.
- Over-current due to excessive refrigerant.

Troubleshooting


When F98 indication happens
Get restarted and measure the input current.
Is Input current > 16.8A?
NO
• Replace the outdoor unit PCB.
YES
Turn off power supply. Check the main circuit electrolytic capacitor.
Normal?
YES
• Repair the pipe flare or union nuts. Reclaim and recharge refrigerant.
NO
Check refrigerant amount.
NO
Excess refrigerant?
YES
• Reclaim and recharge with correct amount of refrigerant.
NO
• Replace outdoor unit PCB
• Replace outdoor unit compressor
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

14.4.23 F99 (Output Over Current Detection)

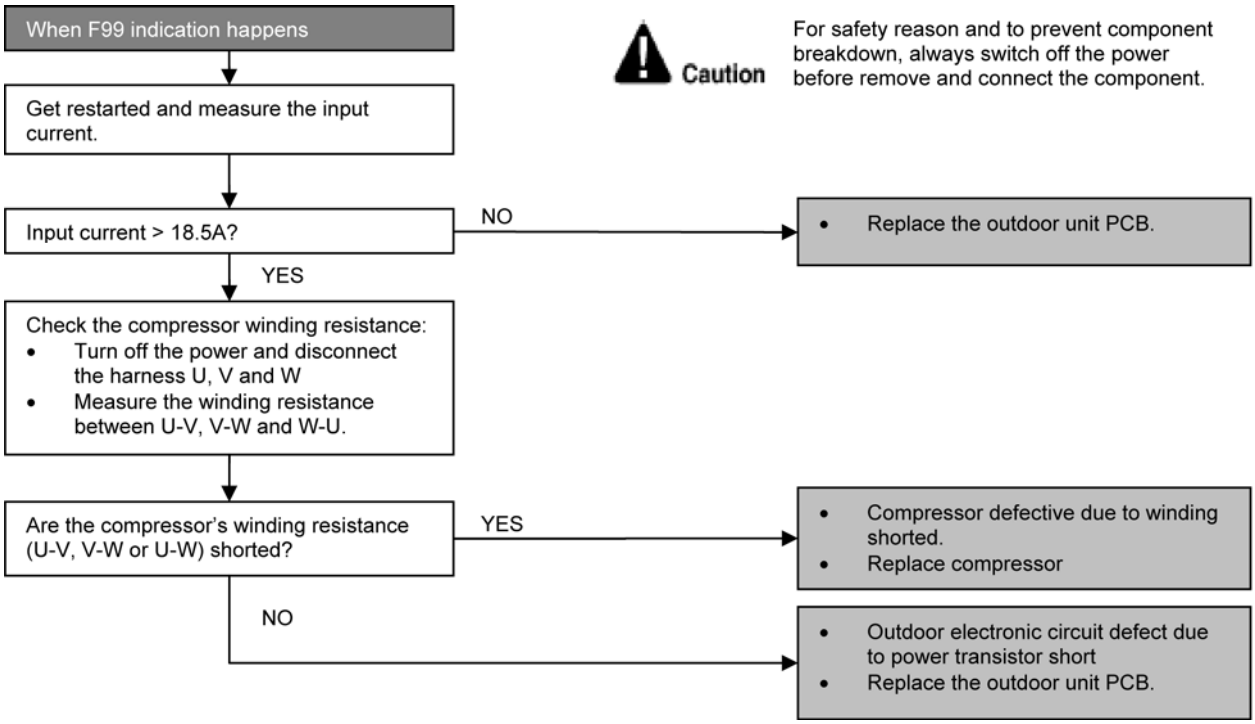
Malfunction Decision Conditions

During operation of cooling and heating, when an output over-current (18.5A) is detected by checking the current that flows in the inverter DC peak sensing circuitry.

Malfunction Caused

- DC peak due to compressor failure.
- DC peak due to defective power transistor(s).
- DC peak due to defective outdoor unit PCB.

Troubleshooting


When F99 indication happens
Get restarted and measure the input current.
Input current > 18.5A?
NO
Replace the outdoor unit PCB.
YES
Check the compressor winding resistance:
Turn off the power and disconnect the harness U, V and W
Measure the winding resistance between U-V, V-W and W-U.
Are the compressor's winding resistance (U-V, V-W or U-W) shorted?
YES
Compressor defective due to winding shorted.
Replace compressor
NO
Outdoor electronic circuit defect due to power transistor short
Replace the outdoor unit PCB.
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

- Checking the power transistor
- Never touch any live parts for at least 10 minutes after turning off the circuit breaker.
- If unavoidable necessary to touch a live part, make sure the power transistor's supply voltage is below 50V using the tester.
- For the UVW, make measurement at the Faston terminal on the board of the relay connector.

Tester's negative terminal	Power transistor (+)	UVW	Power transistor (-)	UVW
Tester's positive terminal	UVW	Power transistor (+)	UVW	Power transistor (-)
Normal resistance	Several kΩ to several MΩ			
Abnormal resistance	0 or ∞			

15. Disassembly and Assembly Instructions

WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

15.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

15.1.1 To remove front grille

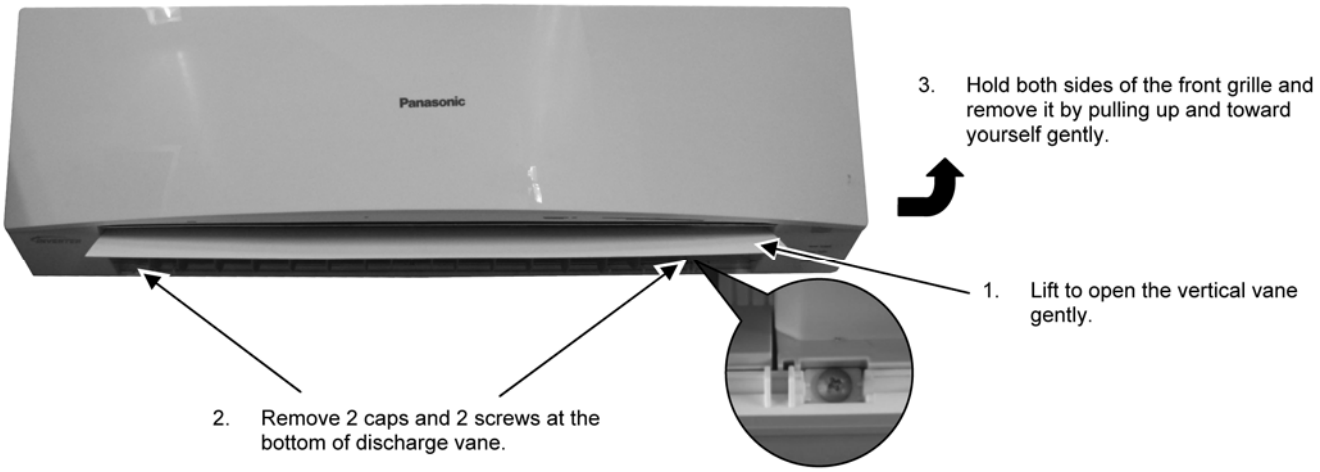

Panasonic
3. Hold both sides of the front grille and remove it by pulling up and toward yourself gently.
1. Lift to open the vertical vane gently.
2. Remove 2 caps and 2 screws at the bottom of discharge vane.

Figure 1

15.1.1.1 To remove power electronic controller

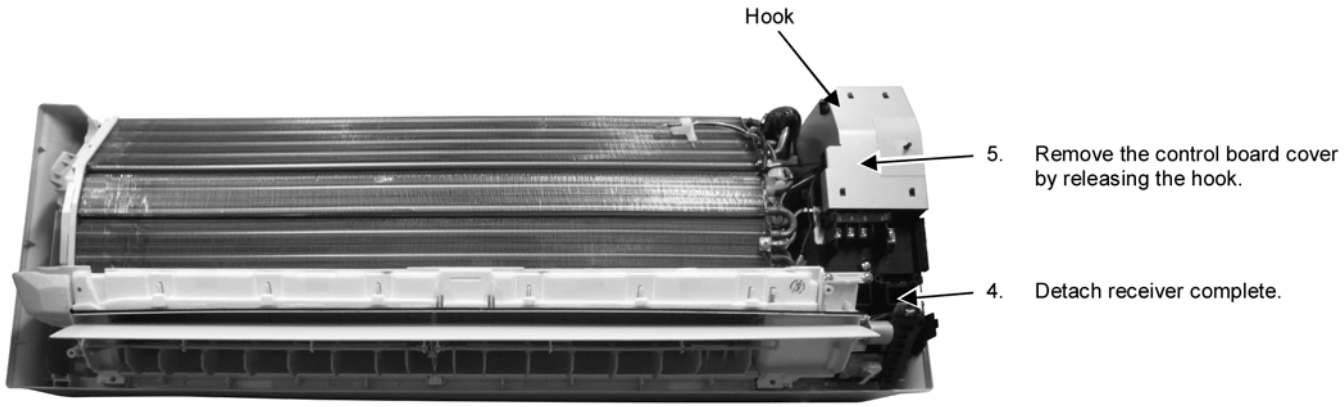


Figure 2

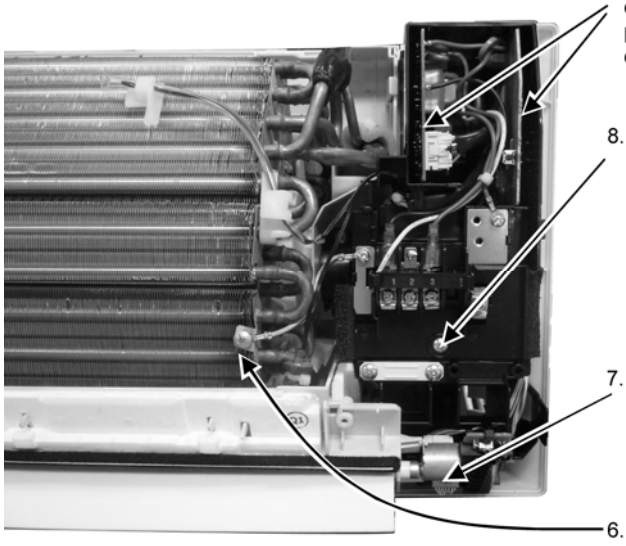

9. Pull out the main electronic controller and power electronic controller halfway.
8. Remove screw to remove terminal board complete.
7. Detach the CN-DISP connector then remove the indicator complete.
6. Detach the Earth wire

Figure 3

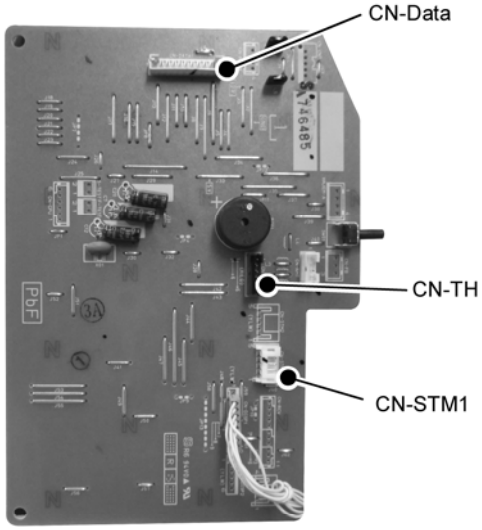

10. Detach 3 or 4 connectors as labeled from the electronic controller. Then pull out main controller gently
CN-Data
CN-TH
CN-STM1

Figure 4

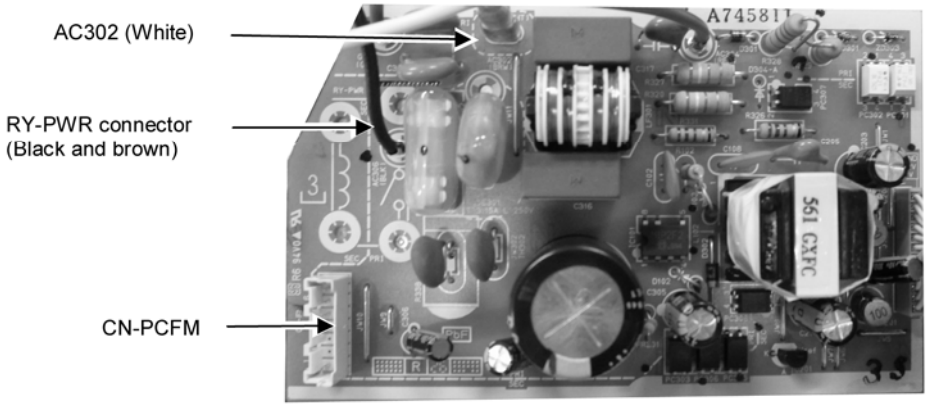

AC302 (White)
RY-PWR connector (Black and brown)
CN-PCFM
11. Detach the AC303 and CN-PCFM connectors from the electronic controller. Then pull out power electronic controller gently.

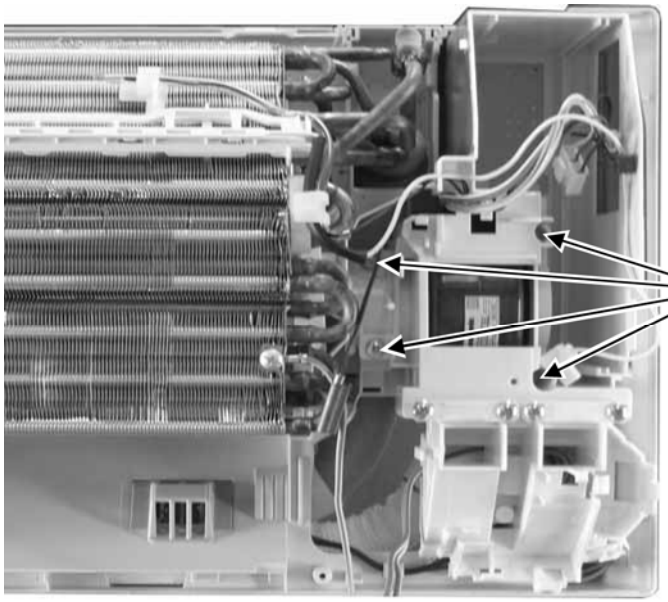
Figure 5

15.1.1.2 To remove discharge grille

12. Pull out to remove the drain hose from the discharge grille
13. Then pull the discharge grille downward gently to dismantle it

Figure 6

15.1.1.3 To remove control board



14. Remove 4 screws holding the control board then pull out the control board.

Figure 7

15.1.1.4 To remove cross flow fan and indoor fan motor

15. Remove the screw that holding the cross flow fan and fan motor axis.

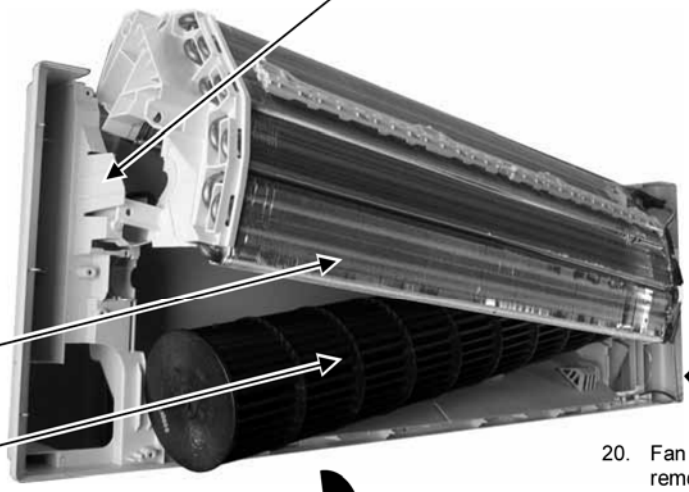
Figure 8

17. Remove the bearing by pulling it out gently

16. Remove the screw from the evaporator.

Figure 9

18. Push the holdfast to the left and lift up the evaporator.

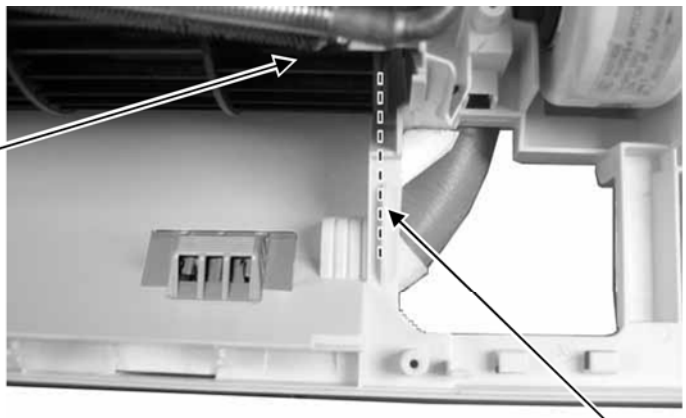


19. Remove the cross flow fan from the unit by pulling it to the left and downward.

20. Fan motor can be removed after the removal of cross flow fan.

Reminder: To reinstall the fan motor, adjust the fan motor connector to 45° towards you before fixing control board.

Figure 10



Reminder: To reinstall the cross flow fan, ensure cross flow fan is in line as shown in figure 11

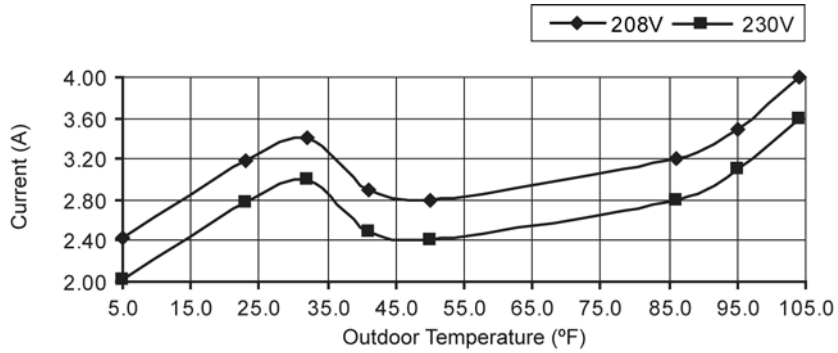
Figure 11

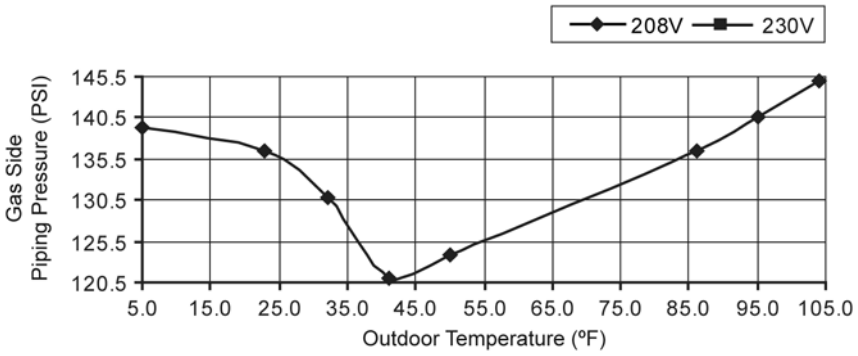
16. Technical Data

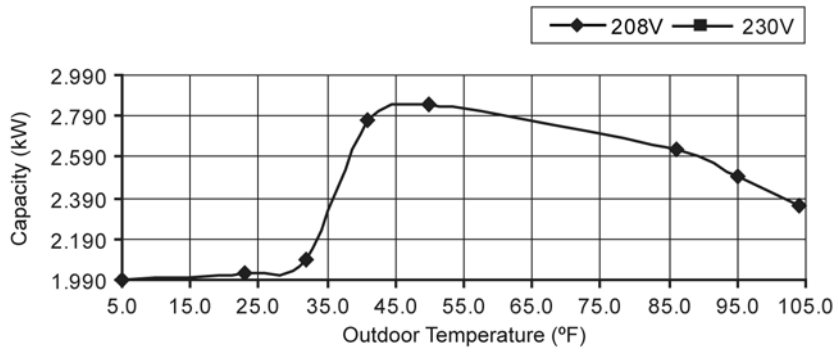
16.1 Operation Characteristics

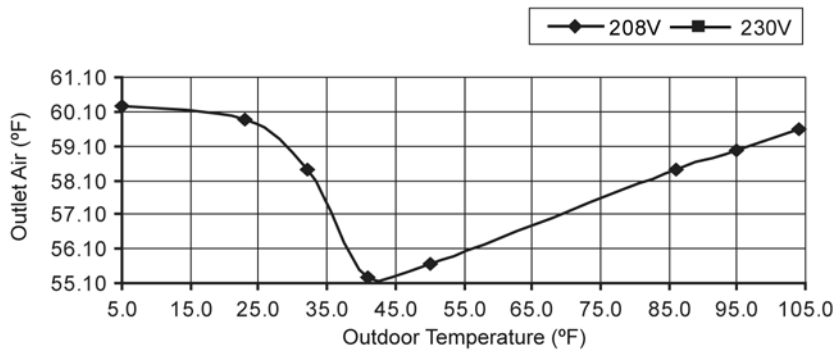
16.1.1 CS-S9NKUA CU-S9NKUA

- Cooling Characteristic
  - o Room temperature: 81°F (DBT), 66°F (WBT)
  - o Operation condition: High fan speed
  - o Piping length: 24.6ft
  - o Compressor Freq: Fc

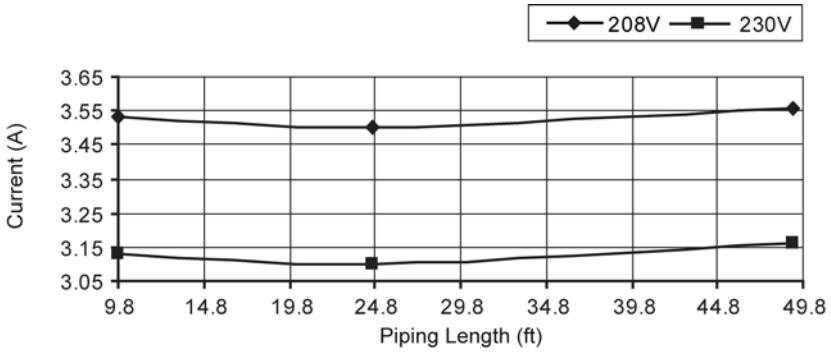


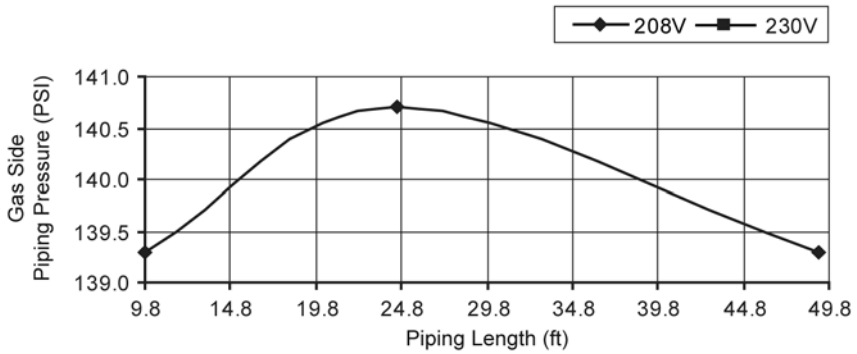


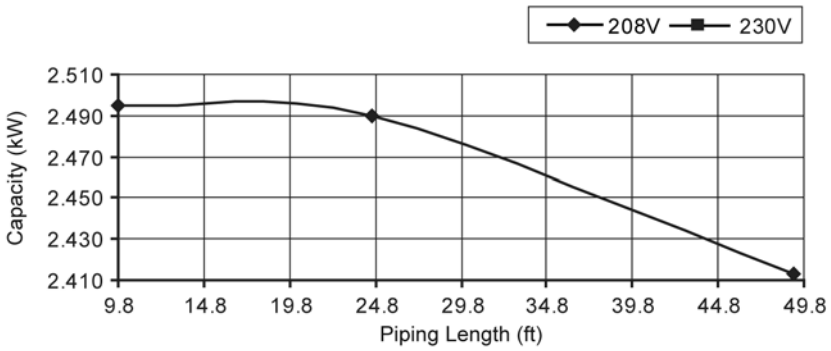


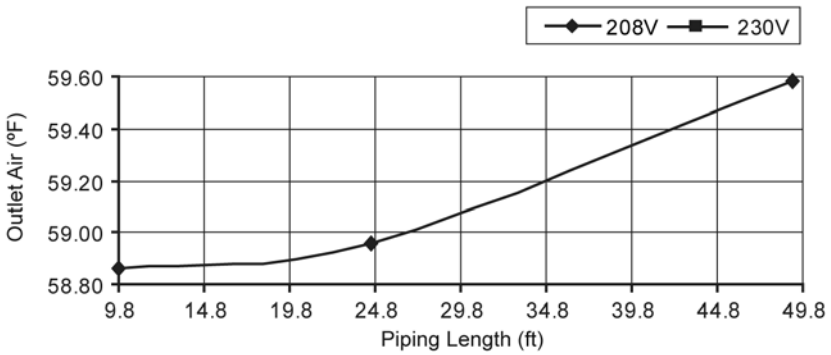


- Piping Length Characteristic
  - Room temperature: 81°F (DBT), 66°F (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 95°F (DBT)
  - Compressor Freq: Fc



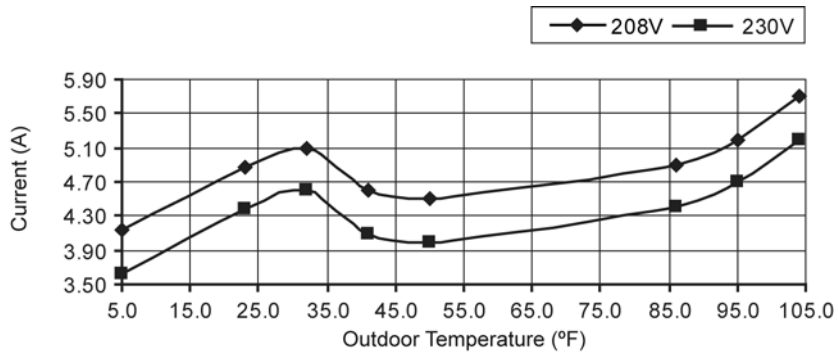


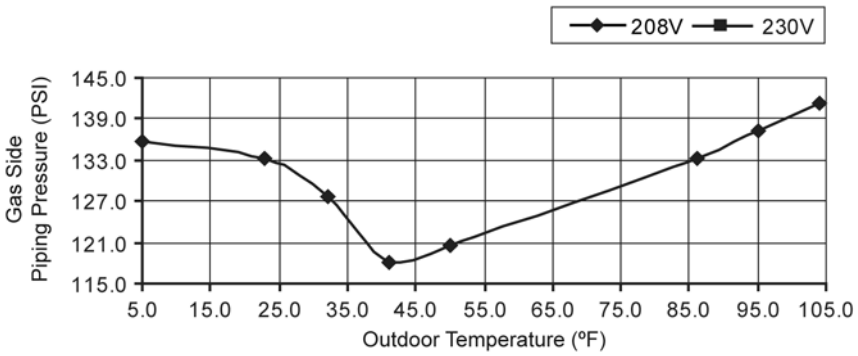


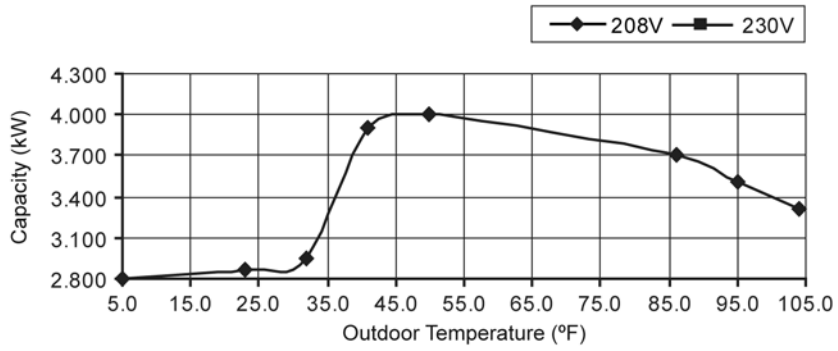


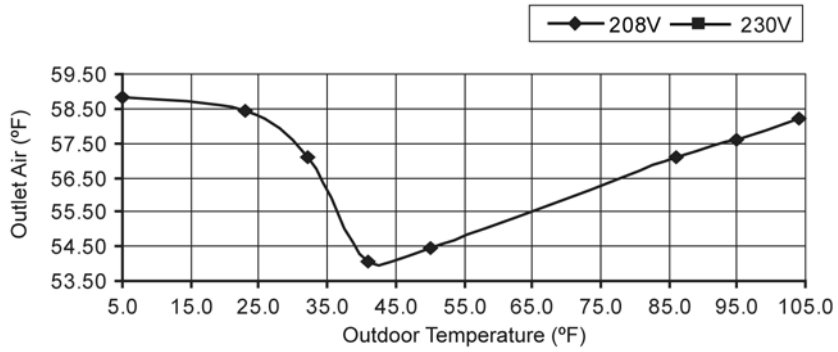
16.1.2 CS-S12NKUA CU-S12NKUA

- Cooling Characteristic
  - o Room temperature: 81°F (DBT), 66°F (WBT)
  - o Operation condition: High fan speed
  - o Piping length: 24.6ft
  - o Compressor Freq: Fc

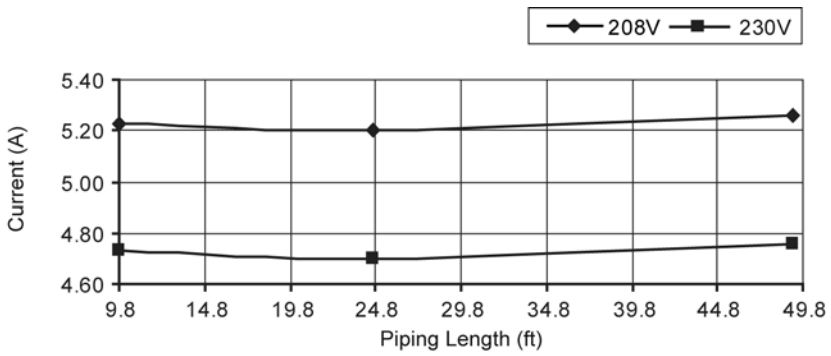


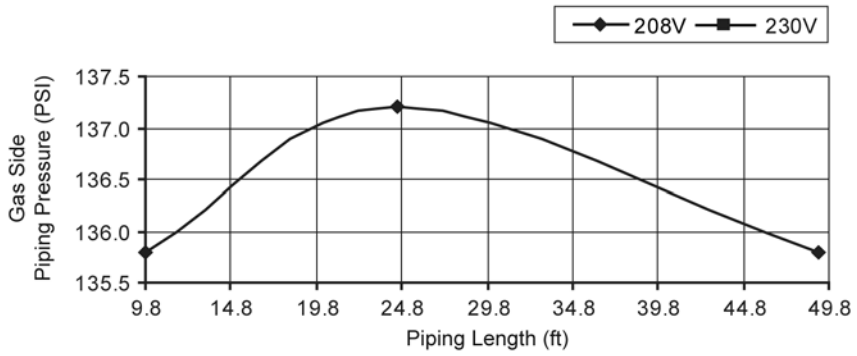


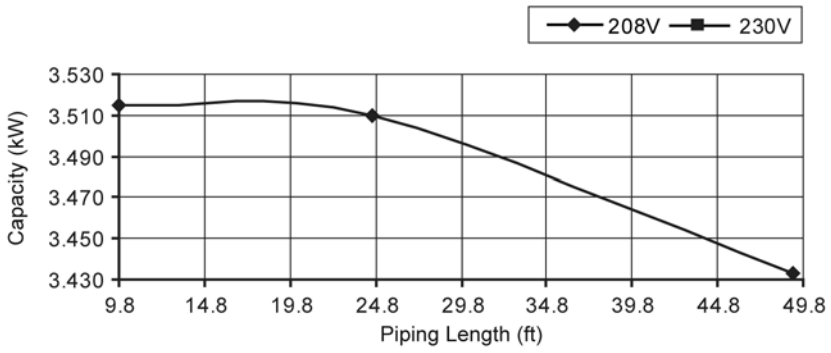


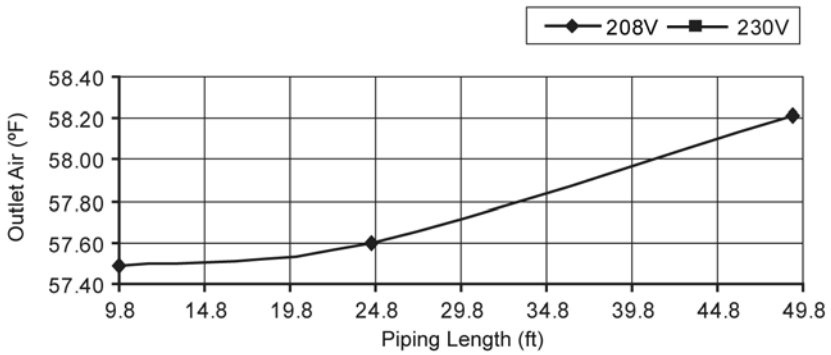


- Piping Length Characteristic
  - o Room temperature: 81°F (DBT), 66°F (WBT)
  - o Operation condition: High fan speed
  - o Outdoor temperature: 95°F (DBT)
  - o Compressor Freq: Fc





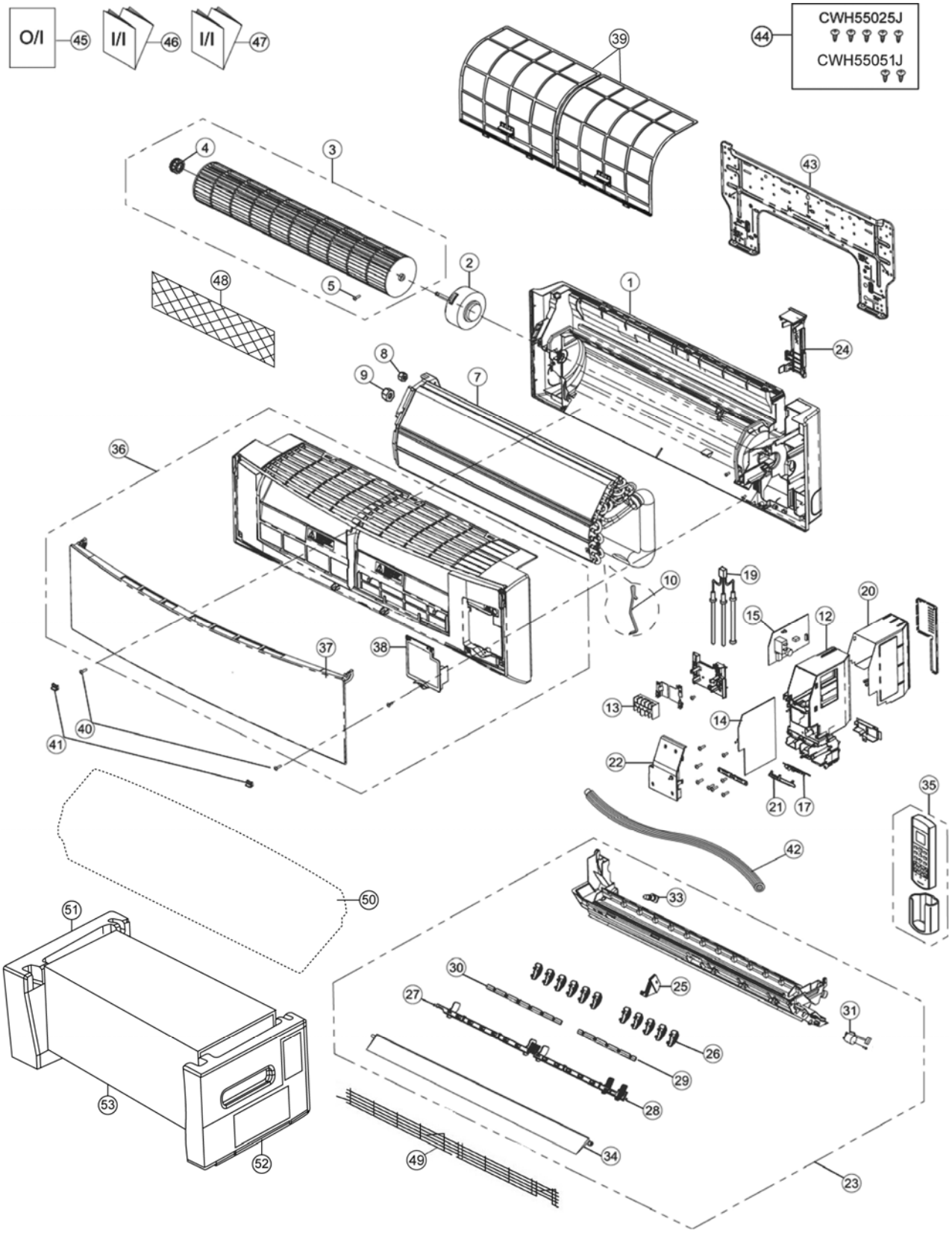




17. Exploded View and Replacement Parts List

17.1 Indoor Unit

17.1.1 CS-S9NKUA CS-S12NKUA



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

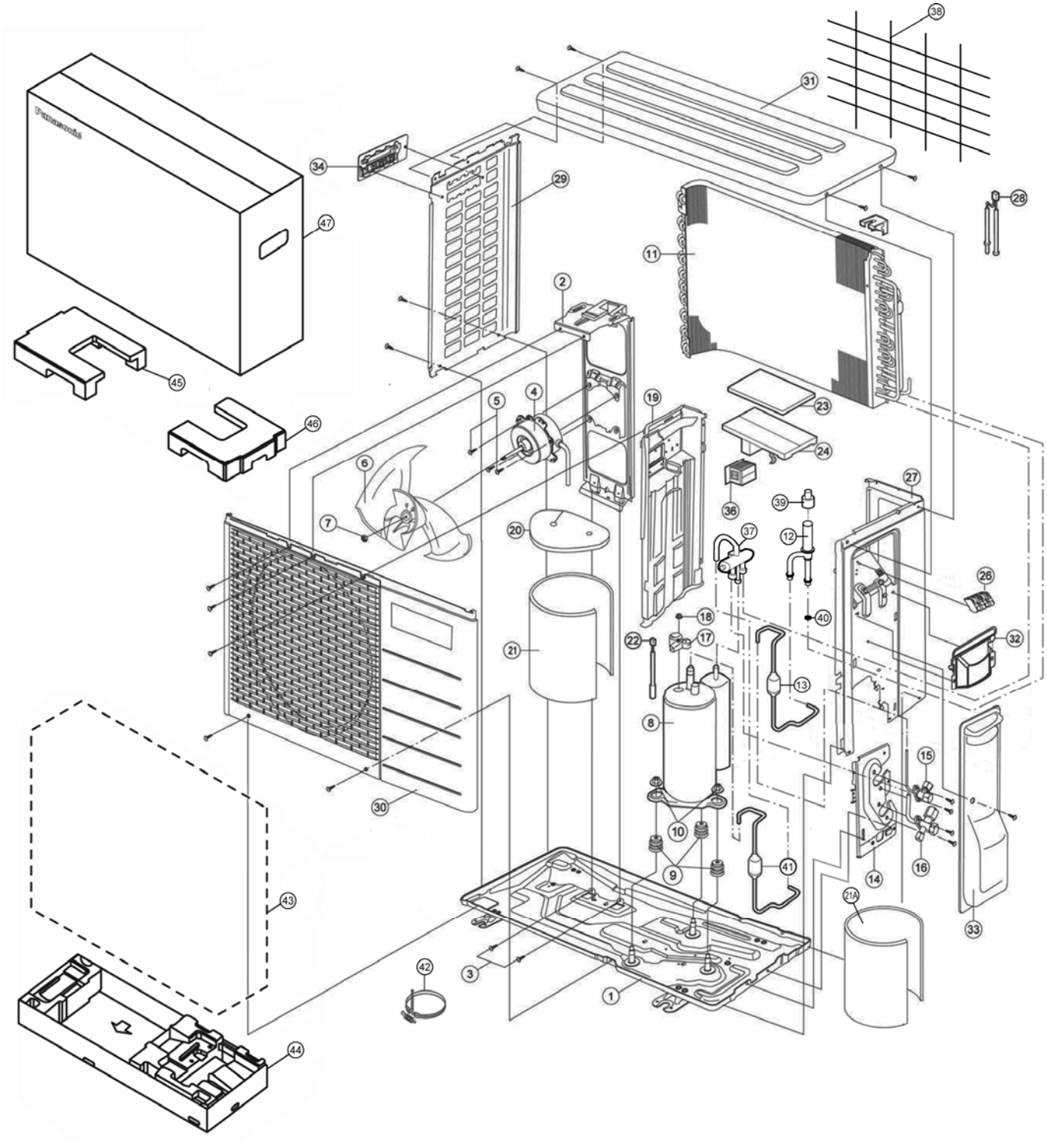
REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-S9NKUA	CS-S12NKUA	REMARK
1	CHASSIS COMPLETE	1	CWD50C1633	←	
2	FAN MOTOR	1	L6CBYYYL0055	←	O
3	CROSS-FLOW FAN COMPLETE	1	CWH02C1076	←	
4	BEARING ASSY	1	CWH64K007	←	
5	SCREW - CROSS-FLOW FAN	1	CWH551146	←	
7	EVAPORATOR	1	CWB30C3504	CWB30C3505	
8	FLARE NUT (LIQUID)	1	CWT251030	←	
9	FLARE NUT (GAS)	1	CWT251031	CWT251032	
10	CLIP FOR SENSOR	1	CWH32143	←	
12	CONTROL BOARD CASING	1	CWH102370A	←	
13	TERMINAL BOARD COMPLETE	1	CWA28C2357	←	O
14	ELECTRONIC CONTROLLER - MAIN	1	CWA73C6145	CWA73C6146	O
15	ELECTRONIC CONTROLLER-POWER	1	CWA746567	←	O
17	ELECTRONIC CONTROLLER-INDICATOR	1	CWA746489	←	O
19	SENSOR COMPLETE	1	CWA50C2800	←	O
20	CONTROL BOARD TOP COVER	1	CWH131350	←	
21	INDICATOR HOLDER	1	CWD933021	←	
22	CONTROL BOARD FRONT COVER CO.	1	CWH13C1201	←	
23	DISCHARGE GRILLE COMPLETE	1	CWE20C3038	←	
24	BACK COVER CHASSIS	1	CWD933233B	←	
25	FULCRUM	1	CWH621102	←	
26	VERTICAL VANE	11	CWE241287	←	
27	CONNECTING BAR	1	CWE261152	←	
28	CONNECTING BAR	1	CWE261154	←	
29	CONNECTING BAR	1	CWE261155	←	
30	CONNECTING BAR	1	CWE261153	←	
31	AIR SWING MOTOR	1	CWA981240	←	O
33	CAP - DRAIN TRAY	1	CWH521096	←	
34	HORIZONTAL VANE COMPLETE	1	CWE24C1268	←	
35	REMOTE CONTROL COMPLETE	1	CWA75C3580	←	O
36	FRONT GRILLE COMPLETE	1	CWE11C4512	←	O
37	INTAKE GRILLE COMPLETE	1	CWE22C1507	←	O
38	GRILLE DOOR COMPLETE	1	CWE14C1029	←	
39	AIR FILTER	2	CWD001279	←	
40	SCREW - FRONT GRILLE	2	XTT4+16CFJ	←	
41	CAP - FRONT GRILLE	2	CWH521194	←	
42	DRAIN HOSE	1	CWH851173	←	
43	INSTALLATION PLATE	1	CWH361097	←	
44	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	
45	OPERATING INSTRUCTION	1	CWF568315	←	O
46	INSTALLATION INSTRUCTION	1	CWF615167	←	O
48	AIR PURIFYING FILTER	1	CWD00C1141	←	
49	WIRE NET	1	CWD041144A	←	
50	BAG	1	CWG861426	←	
51	SHOCK ABSORBER (L)	1	CWG712940	←	
52	SHOCK ABSORBER (R)	1	CWG712941	←	
53	C.C.CASE	1	CWG565009	←	

(Note)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

17.2 Outdoor Unit

17.2.1 CU-S9NKUA CU-S12NKUA



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-S9NKUA	CU-S12NKUA	REMARK
1	CHASSIS ASSY	1	CWD50K2206A	←	
2	FAN MOTOR BRACKET	1	CWD541089	←	
3	SCREW - FAN MOTOR BRACKET	2	CWH551217	←	
4	FAN MOTOR	1	ARW6404AC	←	O
5	SCREW - FAN MOTOR MOUNT	4	CWH55252J	←	
6	PROPELLER FAN ASSY	1	CWH03K1014	←	
7	NUT - PROPELLER FAN	1	CWH56053J	←	
8	COMPRESSOR	1	5RS102XHA21	←	O
9	ANTI - VIBRATION BUSHING	3	CWH50077	←	
10	NUT - COMPRESSOR MOUNT	3	CWH56000J	←	
11	CONDENSER	1	CWB32C3394	←	
12	EXPANSION VALVE	1	CWB051016J	←	
13	DISCHARGE MUFFLER(EXP VALVE)	1	CWB121021	←	
14	HOLDER COUPLING	1	CWH351015A	←	
15	2-WAYS VALVE (LIQUID)	1	CWB021333	←	O
16	3-WAY VALVE (GAS)	1	CWB011374	CWB011367	O
17	TERMINAL COVER	1	CWH171039A	←	
18	NUT - TERMINAL COVER	1	CWH7080300J	←	
19	SOUND PROOF BOARD	1	CWH151172A	←	
20	SOUND PROOF MATERIAL	1	CWG302570	←	
21	SOUND PROOF MATERIAL	1	CWG302292	←	
21a	SOUND PROOF MATERIAL	1	CWG302569	←	
22	SENSOR CO-COMP TEMP	1	CWA50C2340	←	O
23	CONTROL BOARD COVER-TOP	1	CWH131264	←	
24	ELECTRONIC CONTROLLER - MAIN	1	CWA73C6163R	CWA73C6164R	O
26	TERMINAL BOARD ASSY	1	CWA28K1154	←	O
27	CABINET SIDE PLATE CO.	1	CWE04C1226	←	
28	SENSOR CO-AIR TEMP AND PIPE TEMP	1	CWA50C2793	←	O
29	CABINET SIDE PLATE	1	CWE041492A	←	
30	CABINET FRONT PLATE CO.	1	CWE06C1142	←	
31	CABINET TOP PLATE	1	CWE031018A	←	
32	PLATE - C. B. COVER TERMINAL	1	CWH131301	←	
33	CONTROL BOARD COVER CO.	1	CWH13C1208	←	
34	HANDLE	1	CWE161010	←	
36	REACTOR	1	G0C193J00003	G0C193J00004	
37	4-WAYS VALVE	1	CWB001058	←	
38	WIRE NET	1	CWD041161A	←	
39	V-COIL COMPLETE	1	CWA43C2393	←	
40	STRAINER	1	CWB111061	←	
41	DISCHARGE MUFFLER(4 W.VALVE)	1	CWB121047	←	
42	CRANKCASE HEATER	1	CWA341065	←	
43	BAG	1	CWG861078	←	
44	BASE BOARD-COMPLETE	1	CWG50C2388	←	
45	SHOCK ABSORBER	1	CWG712209	←	
46	SHOCK ABSORBER	1	CWG712210	←	
47	C.C.CASE	1	CWG565107	←	

(Note)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

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